

Weight management is likely to become a priority for community pharmacists

As the Government continues to forge ahead with reforming NHS systems, pharmacists' roles continue to expand with emphasis being placed upon helping the public take better care of themselves, particularly in the community setting where weight management is likely to join the range of commissioned services.

Michael Holden explains some of the proposed changes and available weight management options.

Introduction

In 2005 the Government asked its science-based futures think tank, Foresight, to carry out a review of obesity so it might be better informed about the scale of the problem. Foresight reported its findings, 'Tackling obesities: Future choices,' now into its second edition,¹ in October 2007. This alerted the Government to the worrying fact that by 2050 more than half the UK adult population could be clinically obese resulting in a rise in costly obesity-related conditions. Unsurprisingly, tackling obesity is now a Government priority and the recent White Paper *Pharmacy in England: Building on strengths, delivering the future*,² sets out its programme for 'a 21st-century pharmaceutical service' in which promoting health and preventing illness are central to community pharmacy (CP) roles.

Pharmacists' key strengths are recognised, including 'providing a readily available network of trusted health professionals and their teams based in the heart of communities to promote health and wellbeing, help people look after themselves better, prevent illness and provide essential treatments for those with short or long term illnesses'.² Similarly, the location of CPs as 'a convenient and informal environment for people to easily access health services' or who want 'readily available, sound professional advice' was highlighted. The Government estimate that improving diet could save 70,000 lives a year — or one in every 10 deaths.² Consequently, it is perhaps logical for Government to envision that CP might play a pro-active role in

weight management as part of the enhanced services outlined in Table 1.²

Pharmacy in England is a 'command paper' which lays out Government policy and intent, and affirms pharmacy's place in the NHS and its role as a leading clinical profession in delivering better access to high quality services to patients and the public. While the focus is mainly on CP, its context is wider including hospital pharmacy, professional regulation and education and training. It builds on existing pharmacy service plans^{3,4} and is in line with the pharmacy contractual framework in supporting the expansion of pharmacy workforce roles. It also gives a clear indication of future developments including strengthening the CP role as 'centres for healthy living' in providing advice and help with everyday health concerns, such as smoking, sexual health, diet and nutrition. Specifically responding to local needs and circumstances, pharmacists are encouraged to offer 'advice when selling products such as stop smoking medicines or dietary products', raise awareness of 'the harmful effects of excess drinking' and provide information 'about increasing physical activity' and having a 'healthy diet, helping people

to lose weight if necessary'. It is intended that some pharmacy staff will be trained as 'health trainers', offering coaching support and signposting to the public to support general health and well being.²

Obesity management service example:

In Coventry a pharmacy-based weight management service for obese people was piloted with the primary outcome of a change in body mass index (BMI) and waist circumference. Participants included people aged 18 years or more with a BMI

Table 1. Pharmacy initiatives to improve healthy eating²

How pharmacy can contribute:

Offer the following services to the local community:

- BMI and waist circumference measurements
- Weight management clinics in the pharmacy or elsewhere
- Prescribing or patient group directions to enable the supply of weight reduction medicines as part of an overall weight reduction strategy
- Education, information and advice for all, including families with young children
- Outreach work in the community
- Exercise on prescription
- Recommending the use of the NHS LifeCheck service and working with users to set weight management goals
- Vascular checks.

Likely benefits and outcomes:

- A more health-literate population, aware of the effects of diet and physical activity on health
- Increased awareness of the actions that can be taken to improve health
- Improved access to a range of services aimed at improving diet and physical activity and reducing weight
- Tailored information to help specific patient groups, e.g. children
- Contribution to improving BMI scores, with the potential to improve health overall
- Reduced risk of undetected complications
- The public value community pharmacists as local leaders in health matters.

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of 30–38kg/m² and with at least one diagnosed or established cardiovascular risk factor.^{2,5} Risk factors included hypertension, type 2 diabetes, hyperlipidaemia and waist circumference of >102cm for males and >88cm for women (except if Asian, then men >90cm and women >80cm).²

After eight months of delivery (August 2007) 150 people had been recruited and 470 follow-ups conducted. An average BMI reduction of 0.618 was recorded in 68%,⁵ BMI was unchanged in 16% and increased slightly in 16% during the study.² Similarly, waist circumference was reduced by an average of 3.37cm in 72%,⁵ was unchanged in 4% and increased slightly in 24%.² These promising interim data show how pharmacy

services can support Government's aims by integrating into public health initiatives, such as weight management.^{2,5}

According to PSNC's services database,⁶ weight management services have been commissioned from CP in more than 10 PCTs across England. By setting up joint leadership initiatives it may be possible to work across boundaries to facilitate weight management programmes. An example of this approach is a working partnership between the RPSGB, the North West Strategic Health Authority and the PCTs in the North West. This programme was set up for all GPs, commissioners, PCT senior managers and community pharmacists who were focused on tackling weight manage-

ment. Pharmacists were offered training in raising the issue of weight management with their clients before the start of the formal pilot during the summer of 2008² and findings are awaited with interest.

Weight management strategies

The foundation of a good weight management plan is making lifestyle changes including reduced calorific intake and increased activity. Weight issues can be raised with patients opportunistically, during a medicine use review or as an outcome of a vascular risk assessment. The DH have devised a useful care pathway that can help guide adults towards weight loss (Figure 1) and a range of downloadable information for overweight and obese individuals is provided on the DH website.⁷ The National Heart Forum toolkit '*Lightening the load: Tackling overweight and obesity*'⁸ and NICE guidance on obesity⁹ can also be accessed through the DH website. This resource was developed with PharmacyHealthLink,¹⁰ a public health resource for CPs. An initial assessment of BMI, waist circumference and blood pressure will highlight those adults in most urgent need of engaging in weight reduction regimens. To maximise engagement, healthcare professionals should establish whether an overweight person is concerned about this and is ready and able to make appropriate lifestyle changes.⁷

Motivation and support

There is some evidence to suggest that overweight people are more motivated to lose weight if advised to do so by a health professional.⁷ The National Obesity Forum care pathway and toolkit,¹¹ includes questions, based on the work of Prochaska and Diclemente, that can help healthcare professionals assess an overweight patient's degree of readiness to make changes to their lifestyle. By determining where a person is within the cycle of change — contemplation, action or maintenance — they will be better equipped to judge whether he or she is appropriate for a weight management intervention and how best to offer motivation and support. Of course, a sensitive, empathic, non-judgemental approach should underpin all obesity-related interventions.⁷

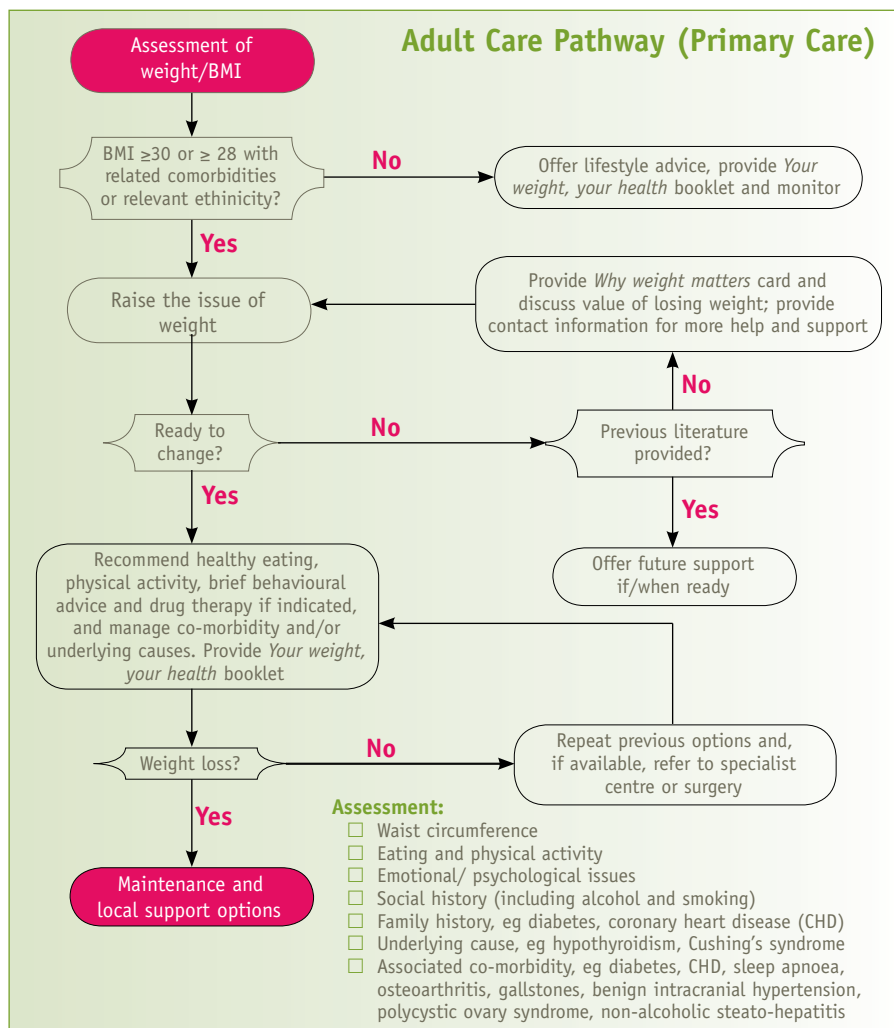


Figure 1. Redrawn from the Department of Health adult care pathway (primary care)⁶

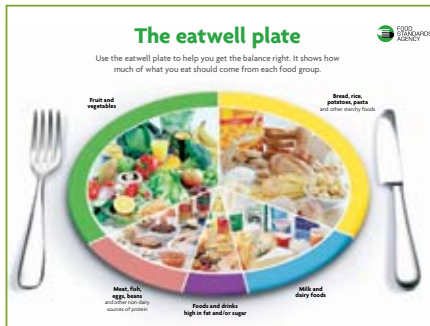


Figure 2. The eatwell plate shows healthy choices¹⁰

First-line management

The equilibrium between daily calorie consumption and energy expenditure needs only to be disturbed by a small but consistent amount and weight gain — or loss — will result. Accordingly, first-line strategies include reducing calorie intake; increasing physical activity while reducing sedentary behaviours; and increasing self-awareness of day-to-day behaviours that affect food intake and activity levels.⁹

The Food Standards Agency’s ‘eatwell plate’ (Figure 2) gives a good visual representation of the types and proportions of foods needed for a healthy balanced diet¹² and is based on sound guidelines for healthy eating. Patients can be counselled about healthy food choices and taking regular exercise, but goals that are set must be realistic and sustainable. Ideally, behavioural strategies to help patients recognise how feelings can influence eating behaviours and advice on setting manageable targets should be offered. Also patients should, if possible, be offered regular support and motivational interviews, which are generally found to be effective for promoting weight loss.⁹

Motivational interviewing is a client-centred directive method for enhancing intrinsic motivation to change by exploring and resolving ambivalence. The aim is for the client (patient) to express concern about their current behaviour and express arguments in favour of change so that they might lead a healthier lifestyle. The approach involves:

- Listening to patients
- Understanding patients’ motivations, empowering them to change and resist-

- ing imposing solutions on them
- Asking open questions and allowing the patient to elaborate
- Affirming positive aims, thoughts, actions already made
- Recognising and being aware of clues to intrinsic motivation revealed through change talk, for example:
 - Desire – I want to do this
 - Ability – I can do this
 - Reason – I am doing this
 - Need – I have to do this
- Agreeing and summarising a plan.

NICE summary on behavioural change¹³

1. Plan carefully interventions and programmes aimed at changing behaviour, taking into account the local and national context and working in partnership with recipients.
2. Interventions and programmes should be based on a sound knowledge of community needs and should build upon the existing skills and resources within a community.
3. Equip practitioners with the necessary competencies and skills to support behaviour change, using evidence-based tools based on theoretically informed, evidence-based best practice.
4. Evaluate all behaviour change interventions and programmes, either locally or as part of a larger project — where possible, including an economic assessment.

Obesity medication

Prescribed medication should be considered in addition to lifestyle changes as part of an overall plan for managing obesity.^{7,9} Currently, the licensed medicines for treating obesity are orlistat and sibutramine.^{7,9} Co-prescribing of weight loss medications is not recommended.⁹

Orlistat should be prescribed only for adults aged 18–75 years who have a BMI of 30Kg/m² or more without co-morbidities, or 28Kg/m² or more with co-morbidities.^{7,9} It should be used alongside a low-fat diet to avoid gastrointestinal side-effects such as flatulence, diarrhoea or faecal incontinence, and oily stools.⁷ Treatment can be continued after three months only if at least 5% of the starting body weight is lost (except in cases of type 2 diabetes) and can be continued

for more than 12 months after discussing the potential benefits and limitations.⁹

Sibutramine should only be prescribed for adults aged 18–65 years who have a BMI of 30Kg/m² or more without co-morbidities, or 27Kg/m² or more with co-morbidities.^{7,9} They should have controlled blood pressure (BP; 145/95mmHg or below); no history of coronary artery disease, arrhythmias, congestive heart failure or stroke.⁷ For the first three months of treatment BP should be checked every two weeks⁷ and regular pulse and BP checks conducted thereafter.⁹ Treatment should only be continued beyond 12 weeks if at least 5% of the starting body weight is lost.^{6,8} Currently, treatment beyond 12 months is not recommended.⁹

Rimonabant was recommended as a possible treatment for obese or overweight adults with risk factors, such as type 2 diabetes or high cholesterol levels.¹⁴ However, on 23 October 2008, the European Medicines Agency issued a statement that its Committee for Medical Products for Human Use had concluded the benefits of rimonabant no longer outweighed its risks and recommended the product be withdrawn from the UK market.¹⁵ In response, Sanofi-Aventis, the manufacturer, imposed a temporary withdrawal of the product.¹⁶

Non-prescription obesity products

All overweight or obese people should be counselled about the benefits of lifestyle measures for weight management. Some will be eligible for prescription medicines, but many will not — including many moderately overweight people who might consider using other dietary aids, which is the subject of the following article.

Conclusions

The government agenda is clearly stated within the *Pharmacy White Paper*;² commissioners must make better use of existing resources and optimise the accessibility and skills of community pharmacists to address local health and public health needs.

Effective weight management can only be achieved by reducing calorie intake and increasing daily activity. Pharmacists

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are increasingly the front-line health professionals called upon to help overweight and obese people address their weight and lifestyle influences. As community pharmacists become increasingly engaged in assessing vascular risk, there will be even more opportunity to support patients at risk as a result of their weight in addition to other risks including smoking cessation. Enabling behavioural change in at risk groups will be a key skill for pharmacists and members of their team engaged in public health and well being services. ❖

Declarations of interest

The author has no interests to declare.

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Focus on OTC weight management products

Dietary products are widely available in national supermarkets, community pharmacies and health food stores. Knowledge of the more common ingredients and their effects may therefore help pharmacists to better inform patients and healthy clients. Some of the easily accessible products are listed in Table 1 along with their main 'active ingredients' and relevant manufacturer's notes.

There is some overlap in ingredients between products listed in Table 1, and in Table 2 some of the studies undertaken to deduce or confirm their effects are presented in brief. In general, there are even fewer rigorously conducted evaluations of non-prescription dietary products than there are of prescription obesity medicines and they often contain a cocktail of ingredients with limited proof of effectiveness or safety. How these ingredients interact individually and collectively with the body and/or with co-medication is often unstated and largely unknown. Marketing appears in some cases to rely on historical uses of individual ingredients without providing proof of efficacy or rationale for the doses used in the products. However, for some products

data is beginning to be generated to shed light on the mechanism of action of some of the ingredients. The main effects of the products listed in Table 1 fall into the following categories:

Appetite suppressant effects, by swelling in the stomach, and producing gastric distension and/or activating vagal mechanoreceptors leading to hypothalamic inhibition of feeding behaviour (alginate, polyglucosamine, NeOpuntia[®], possibly palm/oat oil emulsion) or by direct hypothalamic actions (possibly *Hoodia Gordonii*).

Lipid binding or adsorbing agents, which reduce the access of pancreatic lipase to consumed lipids and/or their breakdown into absorbable fatty acids (polyglucosamine, NeOpuntia[®]).

Delay gastric emptying (Yerba mate, damiana and guarana mixture, NeOpuntia[®], possibly Boldo).

Laxative and/or diuretic actions (possibly butternut and Dandelion root).

Conclusions

The limited data available from manufacturers indicate that products, which act to increase satiation, such as AppesatTM,⁵

LIPObindTM, Slimthru^{®13-15} (possibly Bio-Synergy body perfect[®] and Formoline L112) and Zotrim^{®18-21} can help people reduce their calorie intake. Products that reduce dietary fat absorption, such as LIPObindTM,¹⁰ and possibly Formoline L112 can help reduce the amount of fat absorbed and might therefore benefit those who continue to consume fatty foods despite being encouraged to follow a low-fat, high-fibre, balanced diet. Also, the findings of increased HDL-C and reduced LDL-C in older women taking NeOpuntia[®] with no additional hypolipaeic treatment,²⁹ if confirmed, might be important because HDL-C concentrations tend to fall in post-menopausal women.³⁰ Similarly, low blood HDL-C is an independent risk factor for the development of insulin resistance and metabolic syndrome, which is increasing in line with the rising level of obesity in the population. Clearly, further evaluation of the mechanisms of action, potential side-effects or interactions with medication for dietary product ingredients is warranted to add to the evidence base. ❖

Declarations of interest none
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Table 1. Some nationally available high-street diet products

Product and 'active' ingredients	Adult dosage	Manufacturer's claims/notes
Adios™: ¹ Butternut 20mg, Dandelion Root 30mg, dry extract of Boldo 34mg and dry extract of Fucus 45mg	One tablet 3 times per day, usually at meal times ²	Effective, natural herbal medicines, which help speed up weight loss by speeding up the metabolic rate and stimulating fat metabolism. Exceeding the dose may cause diarrhoea. ²
Adios™ max: ¹ Dry extract of Fucus 120mg	One tablet 3–4 times per day at meal times ³	Stomach upset, cramps, nausea or bloating may occur. Adios™ products not recommended for people with thyroid disease, allergies to ingredients, age less than 16 years or in pregnancy. ³
Appesat™: ⁴ CM3 Alginate extracted from the seaweed <i>Laminaria digitata</i>	Maximum daily dose is 9 capsules taken in three divided doses before main meals, but individualised dosing plans depend upon each person's appetite needs ⁴	Taken before food, it works by stimulating mechanoreceptors in the stomach wall, which then send a signal to the brain informing it that the stomach is full. ⁴ Clinical studies show Appesat™ makes people feel fuller, longer. ⁵ Clinically proven to boost weight loss by more than 67% compared with dieting alone. ⁴
Bio-Synergy Body Perfect®: ⁶ <i>Hoodia Gordonii</i> capsules	None stated ⁶	<i>Hoodia Gordonii</i> contains a molecule that triggers a message in part of the brain to signal when the body is full ⁶ similar to the way glucose acts, but 10,000 times more active. ⁶ Clinical trials show that calorific intake can be reduced by up to 1000kcal/day. ⁶
Bio-Synergy CLA Slimming pill®: ⁶ Conjugated inoleic acid — an omega-6 fatty acid	One capsule 3 times per day with meals ⁶	Can be used long or short term depending on goals. ⁶ Has anti-cancer properties and can help prevent heart disease. ⁶ Should lose body fat with regular use. ⁶ Works by reducing fat mass and increasing muscle mass — because muscle burns more calories than fat, it will help maintain a healthy weight. ⁶ CLA lowers total cholesterol levels while raising the 'good' cholesterol. ⁶
Femmeherb Slim aid: ⁷ Fucus dry extract 45mg, Boldo dry extract 27mg, Butternut bark 10mg and Dandelion root 30mg	1–2 tablets 3 times daily ⁷	Fucus (seaweed) is a mild thyroid stimulant so helping to increase the metabolic rate. ⁷ Boldo and Dandelion support liver function. ⁷ Butternut acts as a mild laxative helping to gently remove waste products from the body. ⁷ Side-effects are not known. ⁷
Formoline L112: ⁸ Polyglucosamine, obtained from crustacean shells	For weight reduction 2 tablets twice per day with main meals and at least half a pint of water. To maintain a target weight, one tablet twice daily with main meals ⁹	Formoline L112 is clinically proven to help lose or maintain weight when used in conjunction with a sensible diet and healthy lifestyle. ⁸ Polyglucosamine adsorbs fat, but is not digestible so is excreted along with a percentage of the fat consumed. ⁹ It also expands and produces a feeling of fullness. ⁹ Contraindications (C/Is) include taking steroids and fat-soluble vitamins. ⁹
LIPObind™: ¹⁰ Dried Prickly pear cactus (<i>Opuntia ficus indica</i>) fibre — called NeOpuntia	Generally, if BMI <24.9 take 1–2 tablets after each meal or 2–3 after a high fat meal. If BMI 25–25.9 take 2–3 for weight loss (but 3–4 if after high-fat meal). If obese take 3 after a meal (3–4 if meal was high fat) ¹⁰	LIPObind™ binds dietary fat creating a fat-fibre complex, which is not absorbed but is excreted naturally. ¹⁰ In clinical trials it removed up to 27% of undigested fat from a standard meal. ¹⁰ The fibre complex will expand to form a stable gel in the stomach. This creates a bulking effect, delays gastric emptying, extends the period of feeling full after a meal and helps reduce sweet food cravings. ¹⁰ C/Is: pregnancy, breast feeding, BMI < 18.5Kg/m ² . ¹⁰ Patient information leaflet states not to take steroids or fat-soluble vitamins within 2 hours of LIPObind™.
Slim shot: ¹¹ Morning tablet: Extracts of green coffee, olive wood, ash wood, cola, mate, cynorhodon, wild pansy, cherry stalk, meadow-sweet, green tea; vitamins B1, B2, B3, B5, B6, B8, B9, B12, C, E Noon tablet: Apple and citrus pectins; guar gum; cider vinegar Night tablet: Extracts of pineapple, cocoa, orange skin, papaya, grape marc, chromium chloride	Effervescent tablets, one to be taken at morning (eliminates fats), noon (restricts fat absorption) and night (burns fats). They 'regulate the slimming chronobiology' ¹¹	The combined action of mate, green coffee, green tea and olive wood helps reduce surplus fat by increasing the body's energy expenditure. ¹¹ Cherry-stalk, orthosyphon and wild-pansy extracts facilitate the draining and elimination of toxins. ¹¹ Ash wood and meadow-sweet help reduce cellulite. Cola and vitamins help maintain the body's strength. ¹¹ The combination of citrus pectins, apple pectins and guar gum effectively moderate the appetite thus helping restrict the absorption of sugars and fats. ¹¹ Cider vinegar helps to restrict fat storage. ¹¹ The combined action of chromium, which helps to moderate the appetite, and papaya helps to restrict fat storage. ¹¹ The combination of cacao and orange peel stimulates thermogenesis, which helps to burn body fat. ¹¹
Slimthru®: ¹² Palm oil, oat oil and water as an emulsion with a neutral smell and oaty taste. (The recommended daily intake of 2 x 7.5ml doses contains 4.2g of fat of which 1.96g is saturated fat)	7.5ml 'shots' — one at breakfast and one at lunch for full effect, but breakfast shot may be sufficient. To be consumed with or in food or alone ¹²	Slimthru® appears to act on receptor proteins found in the small intestine to create a feeling of prolonged satiety. Small droplets stay in the gut for longer than other fats prolonging the feeling of satiety. It can reduce snacking, cut calorie intake by nearly one third ^{13–15} and reduce hunger sensation for up to 8 hours. In clinical trials, after weight loss, it (called Olibra) was shown to promote long-term weight maintenance. ¹⁶ No known side effects. ¹² Not to be taken by pregnant women, under 18 years or people with BMI>30Kg/m ² . ¹²
Zotrim®: ¹⁷ Yerba mate, Guarana and Damiana	2–3 tablets with glass of water or other cold drink before meals — to a maximum 9 tablets per day ¹⁷	Zotrim® causes successful and sustained weight-loss ^{18–20} and reduced waist and hip measurements. ^{19,20} It works by helping users feel full faster during meals, feel less hungry between meals and be more active. This results in eating less during meals, ²¹ snacking less between meals, ²¹ consuming less calories but burning off more calories and successful weight control. ¹⁷

Further information to support product claims was requested from all manufacturers, but to date (22 November 2008) only one (Goldshield) did so. Where published data were available, these have been included. For some products, however, the claimed 'clinical evidence' was not supported by published data.

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Table 2. Common ingredients used in weight management products and experimental basis for their effect

Alginate from *Laminaria digitata*. A randomised double-blind study of 139 people with BMI 25–35Kg/m² given a low-fat, low-calorie diet for 12 weeks found that people who took 3 alginate-containing capsules with 3 main meals lost significantly more weight (9.4+/-3.1Kg; initial weight was 93.6+/-15Kg) than those who took placebo capsules (5.6+/-3.4Kg; initial weight was 86.8+/-9.5Kg). The frequency of self-reported feeling of satiation was higher in the alginate (77.1%) compared with the placebo (54.1%) group, suggesting they felt less hungry more often than the placebo group.¹⁸

Boldo — *Peumus boldus Molina*. At 2.5g dry extract prolonged oro-caecal transit time in 12 human subjects.³⁵ However, this dose is around 20–25 times greater than the amounts stated in the products in Table 2 and there is no conclusive evidence for these effects at the dosages used in the products listed in Table 2.

Butternut — *Juglans cinerea*. The inner bark contains naphthoquinones (among other constituents) which could have a similar laxative action to the anthraquinones found in rhubarb (*Rheum palmatum*) and senna (*Cassia angustifolia*). Data is lacking for such effects at dosages used in the products listed in Table 2.

Dandelion root — *Taraxacum officinalis*. There is no conclusive evidence to support effects seen at the doses used in the products surveyed.

Fucus (seaweed) contains high levels of iodine, but no clinical studies were identified that examined the effects of Fucus-containing products on thyroid status or metabolism to support manufacturer's claims. A plethora of effects of fucoidans extracted from Fucus have been reviewed recently, however.³⁶

Hoodia Gordonii³⁷ extracts contain the p57 molecule — a pregnane glycoside.³⁸ When given intracerebroventricularly to rats p57 resulted in reduced food intake, possibly through normalising hypothalamic ATP levels.³⁹ Data is lacking to support efficacy as an appetite suppressant and the dosages used in the products in Table 2, however.

Conjugated linoleic acid (CLA). Animal studies show CLA consumption reduces body fat, but results in humans are less conclusive.⁴⁰

NeOpuntia® — *Opuntia ficus indica* leaves. In an unpublished cross-over study, 10 healthy volunteers (5 women) with a BMI of 23.3 Kg/m² were randomly divided into two groups and given capsules of either NeOpuntia® (1.6g) or placebo at each meal for one week. The groups crossed over after a washout period. Meals were controlled to ensure a standardized intake of lipids. Intestinal absorption fat was evaluated by measuring steatorrhea in 3-day-old faeces at the end of the two test periods. The quantity of fat excreted compared with fat ingested was on average 27.4% higher in the NeOpuntia® group, suggesting an effectiveness within the framework of meals rich in fat content (unpublished data supplied by Goldshield). Following a study showing a reduction in low-density lipoprotein cholesterol (LDL-C) in NeOpuntia®-treated rodents⁴¹ the first randomised, placebo-controlled, double-blind, 6-wk study of NeOpuntia® was completed by 59 women, aged 20–55 years with metabolic syndrome and BMI 25–40Kg/m².⁴² All volunteers followed well balanced diets with controlled lipid input. NeOpuntia® (1.6g) or placebo capsules were taken at each meal. For 42 females aged 45 years or more taking NeOpuntia® a significant increase in high density lipoprotein (HDL-C) levels and a tendency toward decreased triglyceride (TG) levels was found. In women taking placebo a decrease in HDL-C levels was found. Forty-two females taking NeOpuntia® with no additional hypolipaeamic treatment had a pronounced reduction in LDL-C, especially after day 14. At the study end 39% of the NeOpuntia® group and 8% of the placebo group were no longer diagnosed with metabolic syndrome.⁴²

Palm oil/oat oil emulsion. No data were identified using individual oils, but studies carried out in three studies by the same researchers^{26–28} a dose-related²⁶ reduction in energy and macronutrient intakes,^{26–28} estimated by covert weighing of food serving dishes, was found in non-obese,^{26–28} overweight²⁸ and obese²⁸ people for up to 36 hours²⁶ after consumption of the emulsion. Other researchers found emulsion consumption improved weight maintenance after weight loss compared to placebo.²⁹

Polyglucosamine. Controversial findings from studies of the effect of polyglucosamines (PGs) in obesity are said to result from differences in the formulation used, doses and observation periods.⁴³ However, in one study of patients treated with PG, a significant reduction in body weight (from 82.0 Kg ±7.65 to 76.1 Kg ±7.89), total cholesterol (from 248.3 ±18.35 mg/dL to 214.0 ±15.16 mg/dL) and triglycerides (from 264.3±31.64 mg/dL to 224.6 ±29.85 mg/dL) were found.⁴³ Further controlled studies are needed to confirm and extend these findings.

Yerba mate — *Ilex paraguayensis* leaves. No studies where either Yerba mate (Y), **Damiana** (D; *Turnera diffusa var. aphrodisiaca* leaves) or **Guarana** (G; *Paullina cupana*) were taken alone were identified. However, when used in combination in healthy, overweight patients YDG delayed gastric emptying time (58 +/- 15 min compared to 38 +/- 7.6 min after placebo), reduced the time to perceived gastric fullness and was associated with weight loss (5.1 +/- 0.5 kg with YDG capsules compared to 0.3 +/- 0.08 kg with placebo after 45 days).³¹ In subjects who continued to take YDG for 12 months in an uncontrolled study weight was maintained.³¹

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