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Eleanor J Baldwin

British Journal of Diabetes & Vascular Disease 2004; 4; 333

DOI: 10.1177/14746514040040050901

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Fad diets in diabetes

ELEANOR J BALDWIN

Abstract

Weight reduction is notoriously difficult to achieve and may be more difficult to attain in people with diabetes on insulin therapy and insulin secretagogues. People with diabetes may turn to fad diet books to help them lose weight. The most popular diet books are *The Atkins Diet*, *The South Beach Diet*, *The pH Diet*, *The Blood Group Diets* and *The Zone*. The main features of these diets are reviewed herein. The safety of some of these diets is questionable and their use is debatable.

Br J Diabetes Vasc Dis 2004;4:333-7

Key words: ketosis, weight-reducing, Atkins, diabetes, safety.

Introduction

Weight reduction is notoriously difficult to achieve and may be more difficult to attain in the person with diabetes on insulin therapy and some hypoglycaemic therapies. People with diabetes may turn to fad diets described in popular diet books to help them to lose weight.

The most popular diet books identified by two major UK booksellers in April 2004 were:

- The Atkins Diet¹
- The South Beach Diet²
- The pH Diet³
- Cook Right For Your Type – Four Blood Types, Four Diets⁴
- The Zone⁵

The safety and efficacy of the diet plans described in these books will be reviewed and a comment will be made on their suitability for people with diabetes.

'Fad diets'

The Atkins diet

The Atkins diet was devised and written by a US-based cardiologist, Robert Atkins in 1972. He had written over 13 books on the Atkins Nutritional Approach. Dr Atkins died in April 2003, but his method of eating has enjoyed a resurgence of interest. There is an Atkins Centre for Complementary Medicine, a website and several companies now manufacture and sell the food and nutritional supplements he recommended.

Dr Atkin's hypothesis is that obesity, cardiovascular disease, hypertension and diabetes are results of, or are exacerbated by,



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excessive insulin production, which he believes to be due to an excessive carbohydrate intake.

Comment: Amino acids (protein) and glucose (carbohydrate) stimulate insulin secretion.

The Atkins diet is divided into four phases, see table 1.

The most recently published book by the Atkins group advocates some restriction of saturated fat intake and discusses the benefits of choosing carbohydrate foods according to their glycaemic index. In this book a number of special food products are promoted such as reduced sugar proteinshakes, bread mixes, cereal bars, chocolate and chocolate drinks. These products tend to be based on soya and soya flour and rely on artificial sweeteners such as sucralose and the sugar alcohols for sweetness.

Comment: These products cannot be recommended as they are not low in calories and they are not designed to replace nutrients absent from this diet (the diet is high not low protein).

Correspondence to: Mrs Eleanor J Baldwin

Beta Cell Diabetes Centre, Chelsea and Westminster Hospital, 369 Fulham Road, London, SW10 9NH, UK.

Tel: +44 (0)20 8746 8000; Fax: +44 (0)20 8237 2732

E-mail: eleanor.baldwin@chelwest.nhs.uk

CURRENT TOPICS

Table 1. The Atkins diet**Phase 1 – induction**

Carbohydrate intake is limited to 20 g of carbohydrate a day. Meat, fish, fowl, full fat cheese, eggs, butter and oil are unlimited. Three cups of salad or two cups of salad and one cup of a non-starchy vegetable are permitted daily. Low fat dairy products, fruit, grains and starchy vegetables are excluded. Readers are advised to check for ketones in the urine after 48 hours on the induction diet. The induction diet should be followed for 14 days.

Phase 2 – ongoing weight loss

Carbohydrate-rich foods are added in, in portions containing 5 g of carbohydrate until each individual finds their tolerance level (where ketones are still being produced and weight loss is still occurring).

Phase 3 – pre-maintenance

To be commenced when a person is only 5–10 lbs above their target weight. Carbohydrate foods are added in until the rate of weight loss has slowed to less than one pound a week.

Phase 4 – maintenance

To be commenced when the target weight has been reached. Carbohydrate foods can be added in until the weight is stable.

Dr Atkins routinely prescribed 30 different nutritional supplements for his patients. The supplements he recommends provide considerably more than the reference nutrient intake for each nutrient.

Comment: There is no scientific evidence to support the use of these supplements in the doses he recommends. Chromium picolinate is recommended in his books for people with diabetes. It currently carries a Food Standards Agency warning because in vitro studies suggest that it may be carcinogenic. The doses of supplements recommended are, in most cases, substantially in excess of the dietary reference value (level of intake designed to meet the requirements of the vast majority of the population) e.g. vitamin C doses of 120 mg are recommended as part of the basic dieters formula, but those who have hyperlipidaemia are advised to take 500–15,000 mg of vitamin C. Consumption of vitamin C in excess of 1 g a day can result in diarrhoea and kidney stones.⁶

The South Beach diet

The South Beach diet was also written by a US-based cardiologist, Dr Agatston. He is critical of the high saturated fat content of Dr Atkins diet and reports that ketosis can cause some dehydration, although phase 1 of his diet is likely to cause ketosis. However, he also believes that high carbohydrate diets, particularly where the carbohydrates have a high glycaemic index, promote hyperglycaemia, which he perceives to promote high levels of insulin secretion to cause obesity. The diet follows three phases, see table 2.

The only nutritional supplement recommended is a fish oil supplement. The dose of fish oil is not discussed.

Comment: Fish oil supplements in excess of 3 g daily may adversely affect glycaemic control.⁷

Table 2. The South Beach diet**Phase 1**

For two weeks, carbohydrate rich foods including fruit, are excluded. 'Normal' helpings of lean meat, poultry, fish, shellfish and low fat cheese are encouraged. A liberal intake of vegetables is recommended. Restricted portions of nuts are recommended. Weight loss of 8–13 lbs is expected. *Comment: Calculation of the phase 1 diet menu suggested that the carbohydrate intake prescribed would be likely to generate ketosis.*

Phase 2

The addition of low glycaemic index fruits and vegetables is recommended as long as weight loss is maintained.

Phase 3

Once the target weight has been achieved, the addition of more low glycaemic index fruits and vegetables and grain products are recommended until weight maintenance is achieved.

Table 3. The pH diet**Level 1**

The 'toxic load' should be decreased by cutting back on cow's milk, caffeine, nicotine, alcohol, fizzy drinks, ready meals, diet foods and sugar. This phase should last for 1–4 weeks.

Level 2

Increase the 'alkaline reserves' by decreasing wheat, using other wholegrains such as rye, increasing the intake of vegetables and vegetable juices, consuming a special mixture of seeds. Meals should consist of a small low fat protein portion and vegetables or salad with seeds.

Level 3

Only 15% of energy should come from protein. Unlimited fruit and vegetables are permitted and raw foods should constitute up to 30% of the diet.

The pH diet

This diet book was co-authored by a nutritionist, Le Quesne (practicing the Indian medical philosophy, the Ayurvedic system) and a beauty therapist, Vyas. The theory promulgated in this book is that the body can be made acid, but that it should be in an alkaline state. The authors believe that this acid-alkaline imbalance is the cause of ill health. The diet comprises three levels, see table 3.

The overall diet plan involves testing the pH of the urine and the saliva and the level of the diet adjusted according to the results of the tests.

A number of nutritional supplements are recommended (a multivitamin, a B complex vitamin, a supplement containing vitamins A, C, E and selenium, a calcium and a magnesium supplement). Digestive enzyme supplements are recommended for those with problems with their digestion (!) and Spirulina is recommended for those with cellulite.

Comment: There are no nutritional or medical reasons why these particular supplements would be desirable.

Table 4. The Zone diet**Step 1**

Calculate your protein requirements using the formulae provided. This involves calculating lean body mass and multiplying by activity factors. e.g. Protein requirement = lean body mass x activity factor (ranging from 0.5–1.0)

Step 2

Plan out your protein distribution throughout the day using the author's 7 g protein exchanges.

Step 3

Allocate yourself one 9 g carbohydrate exchange for every 7 g protein exchange you have. These carbohydrate foods should have a low glycaemic index.

Step 4

Allocate yourself one fat exchange (containing 1.5 g of fat) for every protein exchange. Monounsaturated fat sources are highlighted as good choices.

Step 5

Restrict calorie intake at meals to 500 kcals and snacks to 100 kcals.

Table 5. The Blood Type diet**Diet for Type O**

Meat, fish, poultry and a variety of fruits and vegetables are recommended. Many grains, wheat, legumes and most dairy products are excluded. Three to four eggs a week are allowed. Pumpkin seeds and walnuts are the only nuts and seeds recommended. A calcium supplement (600–1,100 mg) is recommended on the basis that the calcium intake is likely to be low.

Diet for Type A

Oily fish, grains, soya, legumes, fruit, vegetables, pumpkin seeds, sun flower seeds, almonds and walnuts are recommended. Small amounts of fermented dairy products (e.g. yoghurt) and chicken are recommended occasionally. Other dairy products, meat and white fish should be avoided.

Diet for Type B

Lamb, game and dairy products are permitted, as are dairy products and most fruit and vegetables. Chicken, shellfish, salmon, hard cheeses, nuts, seeds, wheat and rye are excluded. Small amounts of soya are permitted.

Diet for Type AB

Primarily vegetarian. Small amounts of meat, dairy, tofu and oily fish are allowed. Salmon, shellfish, white fish, nuts (except peanuts) should be avoided.

A weight reducing calorie prescription of 1,500 kcals for women and 1,900 kcals for men is recommended.

Comment: These prescriptions are commonly recommended for facilitating weight loss and are likely to be too low for the physically active, young adults and the morbidly obese.

The Zone diet

The Zone diet was written by a biochemist. The philosophy promoted is that the genetically-based insulin response to carbohydrate is highly variable, and that for the majority a high carbohydrate diet will lead to obesity because it promotes insulin secretion. Six hours walking or three hours jogging a week is recommended.

The book gives a step-by-step guide to constructing your own diet, see table 4.

A vitamin E supplement is recommended.

Comment: the vitamin E content of this diet plan is not low.

The Blood Type diet

Four different diets are recommended according to the blood group of the reader. These are briefly summarised in table 5.

15–30 ml of olive or flaxseed oil is recommended for all groups daily.

Different forms of exercise are recommended for different blood types. Type O people are advised to undertake exercise such as aerobics or jogging. Type A and AB are advised to walk, do yoga or tai chi. Type B people are advised to cycle, hike or take part in martial arts.

The efficacy of these fad dietary regimens

The Atkins diet, and during weight loss, the South Beach diet are low carbohydrate diets. There have been three scientific trials of

low fat versus low carbohydrate weight reducing diets. The first study⁸ was carried out over six months. It found that the low carbohydrate diet, in morbidly obese people (BMI > 40), with a high prevalence of diabetes, was associated with greater weight loss, a more significant improvement in triglyceride levels and insulin sensitivity. Two longer term randomised, controlled trials^{9,10} comparing low fat and low carbohydrate weight reducing diets found greater weight loss at three and six months on the Atkins style diet, but at one year, the difference was not significant as a substantial amount of the weight that the low carbohydrate dieters had lost was regained. This suggests that short-term weight loss on these dietary regimens, with associated improvements in biochemistry are better than those on a low fat hypocaloric diet. However, long-term weight maintenance results do not appear to be good. In all three trials, drop out rates were high and adherence rates to the low carbohydrate diet were low. No studies of low carbohydrate diets of greater than one years duration have been published to date. In contrast, a long-term trial (2–4 years) of a carbohydrate modified (low glycaemic index) hypocaloric diet supplemented with metformin observed 90.5% weight maintenance in women with a form of metabolic syndrome who had reduced their weight to a normal BMI or achieved a 10% weight loss target. A significant decline in fasting insulin levels (-27.5–43.8%, p=0.002) was also observed.¹¹

The pH diet, the Blood Group Diets and the Zone diets have not been subjected to randomised controlled trials.

Comparisons of the macronutrient composition of fad diets with current nutritional recommendations

The macronutrient composition of the diets was calculated and

Table 6. Composition of fad diets and Diabetes UK recommended diet (energy distribution)

Diet		Energy from protein (%)	Energy from fat (%)	Energy from saturated fat (%)	Energy from carbohydrate (%)
Atkins	Induction diet	28	68	40	4
	Maintenance diet	33	52	19	11
South Beach diet	Phase 1	48	43	12	7
	Phase 2	22	47	14	33
	Phase 3	17	40	7	44
The pH diet	Level 3	20	46	8	36
The Zone diet		30	30	9	40
Blood Group diets	O Group diet	21	32	8	46
	A Group diet	22	35	11	40
	B Group diet	12	44	16	40
	AB Group diet	23	35	16	44

compared with the current Diabetes UK nutritional recommendations, see table 6.¹²

The South Beach maintenance plan, the Zone diet, the pH diet and the Blood Group O diet were within the dietary guidelines for saturated fat intake recommended by Diabetes UK to reduce cardiovascular disease risk in people with diabetes. All of the diet books recommend the use of monounsaturated fat as the first choice for cooking, spreading and as a condiment. This is in agreement with the Diabetes UK guidelines (and the European Association for the Study of Diabetes [EASD] and American Diabetes Association [ADA] guidelines) which highlight its lower susceptibility to lipid peroxidation and hence lower atherogenic potential.¹³ A meta analysis of diets high in monounsaturated fat, with a moderate carbohydrate intake in people with type 2 diabetes – found that such diets increased high density lipoprotein-cholesterol and lowered triglyceride levels compared to low fat, high carbohydrate diets.¹⁴

The saturated fat content of the Atkins diet, and two of the blood group diets are particularly high in saturated fat. Such diets may increase postprandial lipaemia and increase free fatty acids, which may have harmful effects on platelet aggregation and ventricular arrhythmias.^{15,16} One study in children on high fat, ketogenic diets found that such diets, consumed over a six month period, significantly increased low density lipoprotein and very low density lipoprotein-cholesterol.¹⁷

The Atkins diet, in particular, claims that the higher protein content of the diet promotes satiety. Vozzo *et al.*¹⁸ conducted a study looking at the effects of protein rich, versus fat rich, versus high carbohydrate food preloads on later food consumption. In this study, protein rich preloads were not found to have a more satiating effect. Several studies have suggested that the portion size awarded is one of the principal determinants of the quantity of food eaten.¹⁹ The importance of giving portion size advice was highlighted by a randomised study of weight reducing dietary advice given in an out-patient setting by dietitians²⁰ where 'healthy eating' advice was compared with

a portion size advice. Portion size advice resulted in more weight loss.

Are the diets safe for people with diabetes?

The Atkins diet and the weight reducing phases of the South Beach diet are high in protein. High protein diets are not recommended for people with nephropathy as they may increase the rate of decline of the glomerular filtration rate.²⁰

Ketosis

- The safety of ketogenic diets has been questioned following a recent case report of the fatal ventricular fibrillation arrest of a 16-year-old girl who had started a high protein low carbohydrate diet two weeks earlier and presented with profound hypokalaemia and hypocalcaemia during resuscitation attempts.²¹ The safety of the Atkins diet induction phase and the South Beach phase 1 diet are therefore in question.
- Cognitive function has been demonstrated to be reduced during the induction phase of ketogenic diets which may have serious implications for those driving or operating heavy machinery.²²
- Urinary excretion of ketone bodies results in the loss of calcium, magnesium and potassium.²³ As the Atkins diet recommends returning to the induction diet if weight gain occurs, frequent use of this type of diet may result in an increased risk of osteoporosis and kidney stones.²⁴ This increase in risk may be potentiated by the use of the proscribed nutritional supplements, e.g. the vitamin C doses are high and are themselves a risk for kidney stones.

Hypoglycaemia

All weight reducing diets carry a risk of hypoglycaemia for those taking insulin secretagogues and those on insulin therapy. The proportional risk of hypoglycaemia can be expected to be higher in those following diets which induce rapid weight loss (e.g. Atkins and South Beach) and in those with good glycaemic control.



Key messages

- There are serious safety concerns about the short- and long-term safety on the Atkins diet and the South Beach diet. They cannot be recommended to people with diabetes
- Individuals who choose to follow any of these diets should be advised on the titration of hypoglycaemic medication
- Dietetic review to establish the likelihood of nutritional deficiencies should be undertaken in those excluding large numbers of foods, or a food group (e.g. dairy produce)
- The consumption of multiple nutritional supplements carries a risk of toxic effects. People with diabetes should be asked to provide details on their supplement consumption patterns

Micronutrients

Nutritional deficiencies may occur. The relative risk of nutritional deficiencies occurring will be higher when a large number of foods are excluded from the diet. The Atkins diet, in particular, preaches the avoidance of significant quantities of cereals, grains, fruits and starchy tubers. These foods not only provide significant amounts of micronutrients, they also have a role in the promotion of healthy gut function. The incidence of constipation is greater in those following the Atkins diet.

Conclusion

The safety of Atkins and South Beach is questionable. The risk of hypoglycaemia for those on hypoglycaemic medication will be high in the initial and subsequent phases of the Atkins and South Beach diets. Overconsumption of vitamins and minerals can create toxic effects. The Atkins diet in particular advises on the use of multiple nutritional supplements. Excessive intakes are more likely to occur when several nutritional supplements are being taken.

No particular risks appear to be posed by the Zone diet, the pH diet and the Blood Group diets, other than a risk of nutritional deficiency depending on the foods chosen and the risk of hypoglycaemia.

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