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# People who regularly eat breakfast cereals are slimmer than those who don't

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In this article, Margaret Ashwell looks at the increasing evidence to support this claim and shows you how you can use the Ashwell® Shape Calculator ...

You are probably aware that breakfast has long been recommended as part of a healthy diet and, for some time, evidence has been accumulating that people who eat breakfast regularly are slimmer than those who skip breakfast. However, this is not a consistent finding and is not true for all types of breakfast. Scientific publications relating to breakfast cereals were, therefore, systematically reviewed to examine the question, "Are people who eat breakfast cereals regularly slimmer than those who don't?"<sup>1</sup>

## Methods

A literature search was carried out using both breakfast cereals (including pre-sweetened) and breakfast as search terms. The databases searched were MedLine and the Cochrane Register of Controlled Trials. A total of 162 papers were identified as being potentially relevant. Papers that did not look directly at the relationship between breakfast and weight; those that did not specifically look at breakfast cereals; and those that looked at the effect of having additional breakfast cereal at other times of day (lunch or evening) were excluded. This use of inclusion and exclusion criteria

left nine papers; five described studies in adults and four described studies in children.

## Results

### Studies in adults

There were four cross-sectional analyses, although two of these were baseline analyses of prospective randomised, controlled trials (RCTs). Three were in the US and one study was in France. In all, they involved over 43,000 people.

The first analysed the dietary records of 5,039 adults enrolled in the SU.VI.MAX trial.<sup>2</sup> They found that men who ate breakfast cereals most often (on 10-12 days out of a possible 12 days) had a lower body mass index (BMI) than those who rarely ate breakfast cereals (0-1 days out of a possible 12 days) but there was no significant difference in women. There was no significant difference in energy intakes in men, but women who ate most breakfast cereals had significantly higher energy intakes than those who ate the least.

The second analysed dietary recall records from the Third National Health and Nutrition Examination Survey (NHANES III) of 16,452 adults aged 18 years and over.<sup>3</sup> They found that people who ate breakfast cereals had a significantly lower BMI than those who did not eat breakfast (the "breakfast skippers") or who had a non-cereal breakfast after adjusting for other physical and cultural factors. People who ate breakfast cereals had significantly higher energy intakes than "breakfast skippers".

The third study was an analysis of the 24-hour dietary recall records from NHANES 1999-2000 of 4,218 adults aged 19 and over. It found that women who ate breakfast cereals on the day in question were significantly less likely to be overweight than women who did not eat breakfast cereals after adjusting for age, ethnicity, smoking, energy intake, exercise and control weight.<sup>4</sup> The odds ratio for a BMI >25 was 0.70 with 95% confidence intervals of 0.52-0.94. There was no significant difference in men. But, there were no significant differences in energy intakes between



**Table 1.** Summary of comparisons of increased breakfast cereal consumption and outcome measures related to weight in adults<sup>2-6</sup>

Comparison of increased breakfast cereal consumption and:	Significant +ve	Non-significant +ve	Non-significant -ve	Significant -ve	Overall in favour of breakfast cereals
Lower BMI in cross sectional studies	3	1			4/4
Decreased risk of BMI >25 in cross sectional studies	4	1			5/5
Decreased weight gain in prospective study	1				1/1
Decreased weight loss in RCT		1	1		1/2
Decreased energy intakes		1	2	2	N/A

people who ate breakfast cereals and those who didn't.

The fourth cross-sectional study was the baseline analysis of the Physician's Health Study (see next section) where it was shown that men who ate breakfast cereals every day had lower BMI and were less likely to be overweight than those who rarely, or never, ate breakfast cereals.<sup>5</sup>

The one prospective study of breakfast cereals and BMI and weight gain included in the review was an analysis of the Physician's Health Study. The study included 17,881 men aged 40 to 84 years at baseline and followed them up for eight and 13 years.<sup>5</sup> Participants completed annual questionnaires which included an abbreviated, semi-quantitative food frequency questionnaire.

An analysis of the cohort found that men who ate breakfast cereals every day at baseline were less likely to become overweight after eight and 13 years and were less likely to have major weight gain (>10 kg) over this time period than men who ate them rarely or never. The analysis controlled for age, smoking, baseline BMI, alcohol, physical activity, history of hypertension, history of high cholesterol and use of multivitamins.

The fifth paper identified in adults was an RCT of breakfast cereals in weight loss.<sup>6</sup> This trial was in 52 women aged 18-55 years. They were given either breakfast cereals or bran muffins and asked to eat a 1,200 kcal diet in two or three meals a day for 12 weeks. The results were analysed by their previous breakfast habits. There were no significant differences in the

amount of weight lost between any of the groups.

The results are shown in Table 1 as a summary of all the comparisons made in all these studies (men and women counted as separate comparisons). Three out of four comparisons found that there was a significant positive relationship between increased breakfast cereal consumption and lower BMI, ie, those who ate breakfast cereals regularly having lower BMIs than those ate them less frequently.

However, all four comparisons found a positive association. Similar results were found for analyses from the studies which expressed their results as increase risk of subjects having a BMI over 25, and of likelihood of weight gain in the prospective study. The studies consistently show that people who eat breakfast cereals regularly tend to have a lower BMI and are less likely to be overweight than those who do not. Although the studies are not all significant, they all point in the same direction.

#### Studies in children

There were four studies in children; three cross-sectional and one prospective. The studies were conducted in the US, Britain and Spain. Although the numbers are somewhat smaller, there is better dietary recording.

The first examined the relationship between breakfast cereal consumption and BMI in a group of 603 children aged 4 to 12 years.<sup>7</sup> They assessed diet using a 14-day food record. They found that those in the highest third of consumption had lower mean BMIs than those in the lowest third across all age groups.

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**Table 2.** Summary of comparisons of increased breakfast cereal consumption and outcome measures related to weight in children<sup>7-10</sup>

Comparison of increased breakfast cereal consumption and:	Significant +ve	Non-significant +ve	Non-significant -ve	Significant +ve	Overall in favour of breakfast cereals
Lower BMI in cross-sectional studies	4				4/4
Decreased risk of BMI >25 in cross-sectional studies	2				2/2
Decreased energy intakes		1		2	N/A

The proportion of children who were at risk of overweight was significantly higher in the lowest third of consumption. Children in the highest third of breakfast cereal consumption had non-significantly lower energy intakes, but these were not statistically significant.

The second analysed the data from a survey of British schoolchildren carried out in 1983.<sup>8</sup> This survey measured the diets of 2,705 children aged 10-15 years using seven-day weighed intakes. They found that children who ate breakfast cereals had significantly lower BMIs than those who did not. Children who ate the most breakfast cereals had significantly higher energy intakes than non-consumers.

A further cross-sectional study in 200 schoolchildren aged 9-13 years in Madrid found that overweight and obese children omitted breakfast more frequently than normal weight children and ate significantly less cereal.<sup>9</sup> Overweight children had significantly lower energy intakes than normal weight children.

In the prospective study, Barton et al examined the association of breakfast cereal intake with BMI in a group of 2,379 girls aged nine and 10, and followed up for 10 years.<sup>10</sup> They assessed diet using an annual three-day food record. They found that those who ate breakfast cereal more often in those three days had significantly lower BMI and a lower risk of overweight after controlling for age, family context, race, physical activity and energy intake.

At all ages breakfast cereal eaters were significantly leaner than girls who did not eat cereal. They did not report energy intakes. Again, the summary of all the comparisons made in these studies (Table 2) shows that there is consistent evidence that children who regularly eat breakfast cereals tend to have a lower BMI and are less likely to be overweight than those who eat breakfast cereals less frequently.

### People who regularly eat breakfast cereals are slimmer than those who don't. Is this a causal relationship?

#### Confounding factors probably don't explain the effect

The most likely explanation to account for the observed relationship is that it has arisen due to confounding by other lifestyle factors associated with both weight and eating breakfast cereals. Exercise and alcohol intake are two major confounders in adults. Although these and other factors were both taken into account in most of the studies, it is possible that residual confounding remains.

#### Having lower overall energy intakes doesn't explain the effect

One possible mechanism through which breakfast cereal consumption could lead to a healthier weight is through reduced energy intakes due to less snacking later in the day. One study did find a reduction in unplanned snacking in those who ate breakfast but this study did not measure total energy intakes. Of those that did, the trend was for breakfast cereal consumers to have higher energy intakes, not lower (see Tables 1 and 2).

#### Having increased overall energy expenditures might explain the effect

The third possibility is that the effect might be mediated through an increase in energy expenditure. Two studies found that the association remained even after controlling for energy intakes, suggesting that energy expenditure must have been greater. Exercise was also taken into account. One study suggested that the calcium from milk associated with breakfast cereal consumption might be the explanation due to its putative role in

regulating body fat. However a recent meta-analysis of 13 trials of calcium or dairy supplementation found no effect on weight loss - so this is probably unlikely.<sup>11</sup>

#### Having increased post-prandial energy expenditures might explain the effect

Another possibility is through an effect on post-prandial energy expenditure since regular meal frequency leads to higher post-prandial energy expenditure than irregular meal frequency for the same energy intakes.<sup>12</sup> As breakfast skipping is likely to be associated with a more irregular meal pattern it is possible that it is also associated with a lower post-prandial energy expenditure. The stronger association with breakfast cereals than just breakfast per se might be due to lower energy intakes being provided by breakfast cereals than other forms of breakfast foods.

#### Conclusions from the systematic review relating breakfast cereal consumption to weight

There is consistent evidence of an association between breakfast cereal consumption and a healthy weight, but limited evidence for any proposed mechanism that would point to it being a causal relationship.

#### Breakfast cereals and shape

Although most of the studies in the systematic review were based on BMI, one (data from the SU.VI.MAX trial) allowed analysis of the relationship between breakfast cereal consumption and a measure of shape ie, the waist-hip ratio.<sup>2</sup> Men and women who ate breakfast cereals most often had significantly lower waist-hip ratios (ie, were less likely to exhibit central obesity) than those who rarely ate breakfast cereals.

There is now a strong body of evidence that body shape, which can give an estimate of central obesity, is even more important than body weight and BMI, which can only indicate total obesity. Body shape has been estimated from waist-hip ratio for several years, but just recently there has been more attention paid to the waist to height ratio as proxy measure for body shape and central obesity.<sup>13</sup>

#### Ashwell® Shape Calculator - the science behind it and how to use it

The Ashwell® Shape Calculator (see [www.ashwell.uk.com](http://www.ashwell.uk.com)) is based on the waist-to-height ratio (WHtR). A systematic review of studies that have measured WHtR and BMI or waist circumference (WC) and their relationship with metabolic risk factors, diabetes or cardiovascular disease in adults or children has recently been undertaken.<sup>14</sup> Prospective and cross-sectional studies showed odds ratios or correlations which were similar for all anthropometric indices, but tended to be higher for WHtR and WC, than BMI.

Also, WHtR and WC were significant predictors more often than BMI in all prospective analyses, which included nine studies with diabetes outcomes and 14 studies with CVD outcomes. Further, WHtR was a much better screening tool than WC or BMI. The bound-

ary values used in the calculator (WHtR 0.5 for Take Care and WHtR 0.6 for Take Action) are appropriate across age, gender and ethnic populations in adults. This supports the concept of the 'one-shape fits all' Ashwell® Shape Calculator with its simple message: "Keep your waist circumference to less than half your height".

The Shape Calculator allows health professionals and/or their patients to match their waist circumference against their height - in inches or in centimetres - and to see into which category they fall.

These are the four regions and this is what they mean:

- If their shape is in the "chilli" region, they should Take Care.
- If their shape falls in the "pear" region, they have a healthy OK shape.
- If their shape falls in the "pearapple" region, they should Consider Action.
- If their shape falls in the "apple" region they health is probably at risk and they should Take Action.

#### Recommendations for practice

Perhaps you can use the Ashwell® Shape Calculator to assess your patients' shape? Then you could talk to those who fall into the Consider Action or Take Action regions and discuss what action they should take. Apart from giving them general advice on taking more exercise and eating less, you could also remind them about the importance of eating breakfast cereals in the management of weight and shape. ●

#### CPD questions for your portfolio

1. What have I learnt from this article that maintains or develops my professional knowledge and competence?
2. What have I learnt from this article that I couldn't do before?
3. What can I apply immediately to my practice and client care?
4. Is there anything I didn't understand or need to explore further, or read more about in order to clarify my learning?
5. What else do I need to do or know to extend my professional development in this area?
6. What other professional development needs have I identified? This may be as a result of reviewing a work situation or incident in the light of the learning gained
7. How might I achieve the above needs? It may help to convert these needs into short, medium and long-term goals in an action plan. This can be included in your portfolio

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