



Continuing Education

MODULE 17: Cardiology

PART 6

Plant stanols and cholesterol

by Sally Whelan

SUPERMARKETS in Ireland today have many different varieties of spreads, dairy drinks and yoghurts containing plant stanols which manufacturers claim are helpful in reducing cholesterol levels. This article looks at their effectiveness in reducing low density lipoproteins (LDL) and whether they can do so safely. It describes what plant stanols are, their mode of action and potential negative effects. In particular the discussion focuses on how stanols affect obesity and their cost in comparison with other non stanol containing products. The limitations of available research will be highlighted and implications for nursing practice are suggested in the light of these limitations. (Table 1 shows some examples of the products available).

Plant stanols

Plant stanols are found in corn, wheat, rye, maize, nuts, seeds and pulses. When eating a typical 'western' type diet a person consumes 160-400mg of stanols daily and vegetarians may take up to 750mg daily. About 50 years ago stanols were recorded as being able to reduce cholesterol in humans. However, the form they were in then was not palatable or consistently effective. Subsequently statins became available as the first drugs of choice for people with raised cholesterol levels. Recently it was discovered that concentrating stanols and adding them to fatty acids to make an ester, enables them to be added to spreads which are stable and palatable.

How they work

In plants, stanols assist with the structure and function of cells and cholesterol does something similar in humans. Indeed, as cholesterol often gets such bad press it is easy to forget that humans need cholesterol for cell membranes, energy and hormone production. Plant stanols are thought to lower LDL by competing with cholesterol for absorption from the gut. They have a very similar molecular structure and solubility level to cholesterol which means they can bind to receptor sites, preventing cholesterol from doing so.

Low density lipoproteins (LDL) reduction

Some research has shown plant stanols to be effective in reduc-

ing LDL levels. Law reviewed 14 trials and found that consuming more than 2g of plant stanols per day reduced LDL by 9-14 %.¹ A reduction of 10% in LDL was found in the 41 trials examined by Katan.² Most people in these trials had blood cholesterol levels of between 5-7.5mmol/L. The same percentage reductions in LDL were seen when plant stanols were added to low fat diets and to normal fat diets. Katan also compared the relative effectiveness of spreads, milk and yogurts as vehicles for stanols. Spreads were found to lower LDL more consistently than did milk and yoghurts. In another study, Noakes found plant stanol enriched milk reduced LDL by 6-8%, whereas spread reduced it by 8-10%.³

The effectiveness of stanols as an adjunct to statin therapy has also been studied. Blair,⁴ in a randomised double blind trial studied the effect of a placebo spread compared to a spread containing stanols. After eight weeks, the stanol spread had reduced LDL by 17% and the total cholesterol by 12%. This compared with the placebo spread which reduced LDL by 7% and TC by 5%.

Limitations to research supporting stanol efficacy

However, a comprehensive independent review of randomised controlled studies has not yet been completed. Studies involving a large number of people are needed to ascertain if small changes in LDL levels, thought to be due to the stanols, do actually help to reduce atheroma formation and therefore help to reduce cardiovascular disease (CVD) development. It is possible that plant stanols may be more atherogenic than cholesterol. Weingartner looked at the effects of plant stanol supplements on mice. In this study the serum cholesterol was reduced but the level of endothelial dysfunction increased. The mice also had increased amounts of plant sterol deposits in their livers and their central nervous systems.⁵

Adverse effects

In addition to reducing the absorption of cholesterol from the gut plant stanols also reduce the absorption of carotenoids by 10-20 %.⁶ This is problematic as carotenoids are associated with positive health benefits. Absorption from the gut of other fat soluble vitamins may also be reduced. For this reason stanols are not suitable for pregnant women, breastfeeding women, or children under five. Other reported side-effects include anorexia, cramping and diarrhoea. Indeed, gastrointestinal disturbances have been reported to occur in 2.5% of people taking 60mg/day and allergic reactions affect 0.4% of people. Constipation affects 5% of people taking 6g daily,⁷ which is above the recommended daily intake level.

Stanols and obesity

It is well accepted that obesity is a factor which contributes to CVD development. The Health Strategy 2010 recommends that people with a BMI of > 30 should be given lifestyle counselling and every assistance towards reducing their weight.⁸ It also suggests fat intake should provide less than 35% of dietary energy requirements by 2012, and that this should be reduced further to below 30% by 2019. To achieve this target, it is recommended

Table 1

Products containing plant stanols				
Examples of products containing plant stanols and their non-stanol equivalents, compared for calorie content and price				
Product Name	Size of Tub	Kcal/100g	Serving Size	Cost in €
Spreads (3 servings needed daily)				
Kerry Gold	500g	720kcal	10g-0.73g stanols	4.99
Benecol Buttery	500g	570kcal	12g-0.8g stanols	6.85
Floraproactive Light	500g	324kcal	10g-0.75g stanols	4.95
Low Low Cholesterol	250g	331kcal	10g-0.73g stanols	2.99
Low Low	250g	331kcal	No stanols	1.35
Avonmore	250g	526kcal	No stanols	1.19
Yoghurts (3 servings needed daily)				
Benecol	4 pots	97kcal	0.8g stanols	3.49 (87c/pot)
Weight Watchers	4 pots	48kcal	No stanols	2.25 (56c/pot)
Mixed Berries	4 pots	63.8kcal	No stanols	1.50 (37c/pot)
Drinks (1 serving needed daily)				
Benecol Dairy Free	6 pots	30kcal	2g stanols	4.99 (83c/pot)
Benecol Strawberry	6 pots	38kcal	2g stanols	4.99 (83c/pot)
Benecol Light	6 pots	40kcal	2g stanols	4.99 (83c/pot)

Information Source: One Irish Supermarket March 2011

that less than three daily servings of high fat, high sugar, food-pyramid 'top shelf' foods, be consumed daily.⁸

In order to take the recommended 2g of stanols, manufacturers advise that three servings from the range of spreads or yoghurts are needed daily. Using examples from *Table 1*, we can calculate how many calories are consumed in three servings:

- Two servings of spread + one serving yoghurt = 175kcal/day using 'light' products
- Two servings of spread + one serving yoghurt = 233kcal/day using non reduced-fat versions.

Obviously the 'light' reduced fat versions of these spreads contain far less calories and are helpful in keeping calorie intake lower. However, when recommending a low fat, low calorie diet for someone with a raised BMI they would normally be advised to spread margarine very thinly, if they are going to use it at all. By contrast, servings for stanols are 10g or 12g, which is about two teaspoons worth of spread, enough to coat two slices of bread very generously in margarine. The yoghurts at 97kcal per pot are also 49 calories more per pot than low fat low calorie 'diet' versions. Therefore, these are additional calories rather than calories which would be taken in from alternative sources. As such they cannot be regarded as helpful in reducing obesity and CVD risk.

The stanol containing yoghurt drinks have the benefit of containing a whole day's recommended stanols in one drink and are approximately 40kcal each. Even these, if taken daily, will add an additional 14600kcal/year. If 1lb of body fat is equal to 3500 calories, then this is 4.1lb extra body fat just due to yoghurt drinks.

Financial cost

From *Table 1* it is clear stanol containing products cost more than their non stanol equivalents. Low Low margarine 250g costs €1.64 less than Low Low Cholesterol which contains plant stanols. The same is true of yoghurt products, for example, the supermarket own brand yoghurt four pack costs €1.99 less than the

Table 2

Cost of stanol containing products			
Drinks	One serving daily	83c per pot	€302.95/year
Spread + yoghurt	Three servings daily	111c daily	€405.15/year
Yoghurts	Three servings daily	87c per pot	€952.65/year

Benecol version. Thus a daily serving of stanol enriched spread, sufficient to lower LDL, could cost the Irish consumer between €302.95 and €952.65 each year (see *Table 2*).

Implications for nursing practice

There is currently insufficient evidence to confidently confirm the efficacy and safety of stanol containing products. They do not appear to be helpful in assisting patients to maintain a healthy cardio protective body weight, and are relatively expensive in comparison to similar food products. Therefore nurses should not recommend them to patients as being helpful in reducing cholesterol levels. This is in line with the ESC clinical guidelines which suggest stanols should be an optional adjunct to therapy in adults with elevated LDL levels.⁹ If patients wish to use them, they should be advised to use only the low calorie low fat options.

It is also important that they are aware stanol products should not be regarded as a panacea to reduce their cholesterol levels. Instead the benefits of following a healthy cardioprotective diet should be emphasised, as should the merits of obtaining a healthy BMI. For people on a limited budget, better value for money and better health gains will be made through buying five portions of fruit and vegetables daily.

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References on request from: nursing@medmedia.ie (Quote: Whelan S. WIN 2011; 19(6): 37-38)