Dairy foods and cardiovascular health: a review of current evidence

Mary Ward and Helene McNulty

HIGH BLOOD PRESSURE (BP) or hypertension affects more than one billion people globally and is the leading contributor to premature mortality, accounting for almost 10 million deaths in 2015 from heart disease and stroke. Hypertension has also emerged as a leading cause of age-related cognitive impairment. In addition to the established association between midlife hypertension and dementia in later life, elevated BP is strongly associated with vascular dementia and related cognitive disorders, including Alzheimer’s disease. In Ireland, hypertension rates for men and women, recently estimated at 56% and 41% respectively, were reported to be the second and fourth highest among 12 high-income populations investigated, using data from national health examination surveys.1

Diagnosing hypertension

Globally, hypertension remains underdiagnosed, undertreated and poorly controlled. In a recent analysis conducted by the NCD Risk Factor Collaboration, adults living in Ireland, compared with adults from 12 other high-income countries, were reported to be the least likely to have high BP diagnosed, treated or controlled.1 Several highly effective lifestyle and drug treatment strategies are recommended for the treatment of BP and based on current evidence, it is estimated that a 10mmHg reduction in BP results in a 17% reduction in coronary heart disease and a 27% reduction in stroke, as well as a 13% reduction in all-cause mortality.4

In 2017, the American Heart Association published new guidelines for the prevention, detection and management of elevated BP in adults, which revised the threshold for hypertension from 140/90mmHg to 130/80mmHg (systolic/diastolic) BP.1 Several changes were introduced primarily in response to compelling findings from the SPRINT trial, a large multicentre trial that reported lower rates of fatal and non-fatal major cardiovascular events and a 27% decrease of death from any cause, following intensive (systolic BP < 120mmHg) versus standard BP-lowering treatment (systolic BP < 140mmHg).6

In Europe, thresholds remain unchanged although the need to improve control rates through more aggressive treatment and management has been highlighted by the European Society of Cardiology. There is an urgent need, therefore, to consider novel public health strategies that will help to achieve optimal BP at a population level.

Dairy intake and cardiovascular health

Lifestyle interventions to lower BP such as restricting salt, alcohol moderation, healthy eating, regular exercise, weight control, and smoking cessation are important because they can delay the need for antihypertensive drug treatment, while also having health benefits beyond their impact on BP (see Table). Accumulating evidence also strengthens the role for dairy in the prevention and treatment of hypertension and cardiovascular disease.

A diet low in saturated and total fat and rich in fruit, vegetables, and low-fat dairy products, first shown by Appel et al in 1997 to substantially lower BP in the Dietary Approaches to Stop Hypertension (DASH) trial,1 is now well established as an effective strategy to lower BP. The BP-lowering effects of the DASH diet are likely explained by dairy-rich nutrients, including phosphorus and calcium, taken individually or in combination. In a recent systematic review and meta-analysis of randomised controlled trials, which confirmed the effects of the DASH diet as an effective nutritional strategy to prevent CVD, greatest benefits were observed in those with an increased cardiometabolic risk.5

Further evidence of a benefit of dairy foods comes from the recently published INTERnational study on macro/micronutrients and blood Pressure (INTERMAP) conducted in the UK and US, which confirmed that low-fat dairy consumption is associated with lower BP in 2,694 participants aged 40–59 years.6

In terms of the influence of dairy intake on overall cardiovascular disease mortality, the Prospective Urban Rural Epidemiology (PURE) study is one of the most comprehensive studies to be reported in recent years. PURE examined the association of dairy intake (low fat and whole fat) with major cardiovascular disease and mortality in 136,384 adults from 21 countries across five continents.

Higher intakes of total dairy (> 2 servings per day) compared with no intake was associated with a lower risk of total mortality, cardiovascular mortality and stroke, providing strong evidence that consumption of dairy food should also be encouraged in low- and middle-income countries where dairy intake is generally reported to be low.7

Novel approaches to lower BP

In addition to being an excellent source of macronutrients and minerals, dairy foods are also a rich source of several micronutrients and represent the most important source of the B-vitamin riboflavin, in the Irish diet. Analysis of data from the National Adult and Nutrition survey (NANS) found that milk contributes to riboflavin, in the Irish diet. Analysis of data from the National Adult and Nutrition survey (NANS) found that milk contributes to the dietary reference value of 1.6mg/d in at-risk individuals, lowers systolic BP by between 6-13mmHg, independently of the effect of

<table>
<thead>
<tr>
<th>Lifestyle factor</th>
<th>SBP decrease (mmHg)</th>
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<tbody>
<tr>
<td>Weight loss (per 10kg)</td>
<td>5-10</td>
</tr>
<tr>
<td>Dash diet</td>
<td>2-13</td>
</tr>
<tr>
<td>Physical activity</td>
<td>4-9</td>
</tr>
<tr>
<td>sodium reduction</td>
<td>2-8</td>
</tr>
<tr>
<td>Limit alcohol</td>
<td>2-4</td>
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</table>

Table: Lifestyle factors targeted to reduce BP

Modified from Chobanian et al 2003 JNC 7 report

Research undertaken at our centre – the Nutrition Innovation Centre for Food and Health (NICHE) at Ulster University – has reported a novel association between riboflavin and BP in adults with a common genetic factor, the TT genotype in the enzyme methylenetetrahydrofolate reductase (MTHFR), a key enzyme in folate metabolism.8 Randomised trials conducted in hypertensive patients (with and without overt CVD) pre-screened for the MTHFR TT genotype show that targeted riboflavin supplementation, at the dietary reference value of 1.6mg/d in at-risk individuals, lowers systolic BP by between 6-13mmHg, independently of the effect of

Table: Lifestyle factors targeted to reduce BP

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antihypertensive drugs. Further confirmation of these results in a different population is required. However, these findings have important clinical and public health implications by offering a personalized treatment approach for the prevention and management of hypertension in genetically at-risk adults, who represent up to 32% of some populations.

In light of recent evidence calling for lower BP thresholds and improved BP control rates, innovative dietary and lifestyle strategies are required to create sustainable solutions for managing BP, one of the most important yet preventable disease risk factors affecting populations worldwide.

Convincing evidence supports a role for milk and dairy foods in the prevention and treatment of hypertension, with important health implications, given that even small reductions in BP offer significant public health benefits.

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References