

## Dry Beans in the Human Diet May Reduce Risk of Hypertension

By Dawn Schwenke, PhD

Dry beans (*Phaseolus vulgaris L.*) have great potential to reduce risk of hypertension and heart disease. Dry beans are rich sources of potassium, protein, and fiber<sup>1</sup>—nutrients that are important in blood pressure regulation and the prevention and control of hypertension.<sup>2-4</sup> Higher intake of potassium has also been linked to lower risk of stroke in women<sup>5</sup> while higher intake of dietary fiber has been associated with improved function of blood vessels<sup>6</sup> and with reduced risk of death due to heart disease.<sup>7</sup>

Many controlled clinical trials, including those that have studied persons with and without hypertension, have demonstrated that an increase in dietary protein improves blood pressure.<sup>3</sup> Overall, the blood pressure-lowering effect of plant protein is similar,<sup>3</sup> or perhaps even greater,<sup>8</sup> than animal protein.

No randomized controlled trial has tested dry beans' effect on blood pressure reduction or risk of hypertension. However, several observational studies can provide insight.

### NHANES Report Sheds Light

A report describing results from a national dietary survey, the National Health and Nutrition Examination Survey (NHANES) 1999–2002, investigated the relationship between dry bean consumption and dietary composition and blood pressure.<sup>9</sup> In this representative sample of adult Americans, baked beans were the most commonly consumed form of dry beans. The authors thus chose to report results not only for all individuals who consumed dry beans but also separate results for individuals who consumed baked beans and those who consumed all other forms of dry beans.

Consistent with the nutrient profile of dry beans,<sup>1</sup> dietary intake of potassium, magnesium, and dietary fiber was higher in dry bean consumers than non-consumers.<sup>9</sup> Compared with persons who did not consume dry beans, persons who consumed baked beans had slightly lower systolic blood pressure [ $120.4 \pm 1.4$  standard error of mean (SEM) mm Hg versus  $123.3 \pm 0.4$  mm Hg,  $p=0.019$ ], even though these individuals consumed more sodium. Diastolic blood pressure was slightly but not significantly lower in consumers of baked beans and risk of elevated systolic ( $\geq 130$  mm Hg) or diastolic ( $\geq 85$  mm Hg) blood pressure was not different than in non-consumers of beans. Compared with individuals that did not consume dry beans, the authors found that consumers of dry beans other than baked beans had slightly but not significantly lower systolic blood pressure.

However, when the authors considered adults aged 20–40 separately, they found that this younger group of dry bean consumers had a 47% (95% confidence interval 4%–71%,  $p=0.037$ ) lower risk of elevated systolic blood pressure.<sup>9</sup>

### Studies Uncover Conflicting Results

Other observational studies provide further information concerning dry bean consumption and its correlation with hypertension and heart disease. In the first study, the authors characterized dietary patterns of Puerto Rican elders living in the United States and related the observed dietary patterns to blood pressure as well as other characteristics of a cluster of risk factors for heart disease known as the “metabolic syndrome.”<sup>10</sup> Dietary patterns were characterized using a mathematical approach in which complex dietary patterns are reduced to “factors” that represent groups of foods that are associated with one another.

In the studied population, the authors found three dietary factors: the first enriched in meat, processed meat, and French fries; the second distinguished by high levels of rice and beans; and the third factor included high levels of sweets, sugary beverages, and dairy desserts.<sup>10</sup> In this study, the authors found that higher concordance of the dietary pattern with the traditional rice and beans factor was not associated with lower systolic or diastolic blood pressure. Furthermore, higher adherence to the traditional rice and beans factor was associated with more adverse levels of HDL cholesterol, another cardiovascular risk factor.<sup>10</sup>



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References  
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As described below, another study suggests the possibility that the rice component of the traditional rice and beans factor explains the lack of benefit of the rice and beans dietary pattern on blood pressure.

A later study of Costa Rican adults<sup>11</sup> evaluated the association between white rice and dry beans and metabolic syndrome, and individual components of the metabolic syndrome including diastolic and systolic blood pressure. The authors found that after mathematically controlling for relevant differences between individuals and differences in white rice consumption, consumption of < 1 serving of dry beans per day, 1 serving of dry beans per day, and > 1 serving of dry beans per day was associated with a stepwise reduction in diastolic blood pressure ( $p=0.049$ ).

However, increasing dry bean consumption was not associated with a difference in systolic blood pressure in this study. In contrast, for increasing levels of rice consumption, there was a stepwise increase in systolic blood pressure ( $p=0.006$ ) but no change in diastolic blood pressure.<sup>11</sup> The authors also investigated the health effects of the ratio of daily servings of dry beans to white rice. They found that for ratios of daily servings of dry beans to white rice of 1:3, 1:2, 1:1 and 2:1, there were significant decreasing trends for both systolic ( $p=0.020$ ) and diastolic ( $p=0.015$ ) blood pressure. Compared with subjects who consumed a 1:3 ratio of servings of dry beans to white rice, those who consumed a 1:1 ratio of servings of dry beans to white rice had a lower diastolic blood pressure ( $78.3\pm 0.7$  mmHg compared with  $80.7\pm 1.0$  mmHg); further increase in the ratio of dry beans to white rice was not associated with a further reduction in diastolic blood pressure whereas the decreasing trend for systolic blood pressure continued up to a 2:1 ratio of daily servings of dry beans to rice.

HDL-cholesterol and plasma triglycerides were also improved with increasing the ratio of dry beans to white rice.<sup>11</sup>

## Beans, Legumes Help Keep the Heart Healthy

Dry beans and other legumes are components of several dietary patterns that have been associated with reduced risk of heart disease.<sup>12,13</sup> However, very little research has been devoted to testing the effects

of dry beans themselves on heart health. A single study has reported on the relationship between dry bean consumption and nonfatal heart attack.<sup>14</sup> The authors found that compared with persons who consumed dry beans less than once a month, risk of heart attack was 38% (95% confidence interval, 12%–55%) lower in those who consumed 1 serving of dry beans a day, with no further benefit associated with consuming more than 1 serving of dry beans a day.

Importantly, the authors found that the protection associated with consuming dry beans daily was independent of history of hypertension, history of diabetes, and a number of other dietary and lifestyle factors that are associated with heart disease.<sup>14</sup>

## Conclusion

Dry beans, due to their nutrient profile, have great promise for reducing blood pressure, reducing risk of hypertension, and reducing risk of heart disease. While this potential has yet to be tested in randomized controlled clinical trials, the results of available research support the following recommendation:

To optimize the potential benefits of dry beans in controlling blood pressure, reducing risk of hypertension and preventing heart disease, include dry beans in the meal plan, increasing dry beans and/or decreasing white rice/other refined carbohydrates to achieve at least 1 serving of dry beans each day and at least as many servings of dry beans as the total servings of white rice and other refined carbohydrates. At the same time, aim to consume 25% of calories as protein, about half from plant sources.<sup>15</sup> These changes, if adopted in the context of a dietary pattern that matches energy intake with energy needs to maintain ideal body weight, are consistent with American Heart Association Dietary Guidelines to promote health and reduce risk of heart disease.<sup>16</sup> 

## About the Author

Dawn C. Schwenke, PhD, is a research professor in the College of Nursing and Health Innovation at Arizona State University. Her particular interests are in the contribution of diet and lifestyle to cardiovascular disease.

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## Smart Choice Recipe

*Recipe created by The Culinary Institute of America*

## Indian Spiced Black Bean Burgers

Recent studies from the Harvard School of Public Health indicate that replacing beans for red meat may reduce risk of heart disease.<sup>1,2</sup> These heart healthy vegetarian black bean burgers are very flavorful and satisfying with a dense yet moist texture, like a juicy sirloin burger but with less saturated fat and cholesterol. They are also rich in dietary fiber, potassium, and polyphenolic antioxidants.

### Ingredients

- 2 cups cooked/canned black beans
- ½ cup cooked and mashed red skin potatoes
- ¼ cup plain Greek yogurt
- ½ cup whole wheat bread crumbs
- 1 teaspoon garam masala (an Indian spice blend available in most supermarkets, you can substitute curry powder if you like)
- ½ teaspoon cayenne pepper
- ¼ teaspoon kosher salt
- ½ teaspoon black pepper
- ½ cup fresh cilantro, finely chopped
- ¼ cup whole wheat bread crumbs (for coating the burgers)
- 2 tablespoons canola oil
- 4 whole wheat hamburger buns
- 8 lettuce leaves
- 8 tomato slices
- 4 tablespoons mayonnaise



**YIELD:** 4 servings **SERVING SIZE:** 1 burger

### NUTRIENT INFORMATION PER SERVING:

Calories: 465; Total Fat: 20g\*; Saturated Fat: 2.5g; Monounsaturated Fat: 7g; Polyunsaturated Fat: 8g; Cholesterol: 5mg; Protein: 17g; Carbohydrate: 66g; Dietary Fiber: 14g; Sodium: 800mg; Potassium: 895mg

## PREPARATION

1. Pulse 2 cups black beans in a food processor with Greek yogurt, bread crumbs, garam masala, cayenne, kosher salt, and pepper until a coarse purée forms.
2. Transfer to a bowl and stir in the cooked and mashed red potatoes, the cilantro and the remaining 2 cups of black beans. Fold gently to combine, cover the bowl with plastic wrap, and place in the refrigerator to chill for 30 minutes. Form mixture into four patties and dredge each in the bread crumbs to coat.
3. Heat oil in a 12-inch heavy skillet over medium-high heat until it shimmers. Cook burgers in batches until outsides are crisp and lightly browned, turning once, about 5 minutes total.
4. Serve on toasted hamburger buns with desired accompaniments.

## References

1. Pan A et al. Red meat consumption and mortality: Results from 2 prospective cohort studies. *Arch Intern Med.* 2012 Apr 9;172(7):555-63.
2. Bernstein AM et al. Major dietary protein sources and risk of coronary heart disease in women. *Circulation.* 2010 Aug 31;122(9):876-83.

\*Nutrition experts now recognize that total fat in a recipe or meal is meaningless when it comes to heart health. What is most important is the type of fat as well as the type of carbohydrate. For more information, read the review article by Dr. Walter Willett published in the July 2012 issue of the *Journal of Internal Medicine*. The abstract is available at <http://www.ncbi.nlm.nih.gov/pubmed/22583051>





## Canned Beans vs. Dry Beans? The Debate Continues

By Amy Myrdal Miller, MS, RD

*When faced with the choice of cooking with dry beans or canned beans, what's the best option for home cooks? The answer depends on many factors, including cost, convenience, and control.*

### Cost

**If you want to save money, cook with dry beans.**

Dry beans cost less per serving than canned beans. For example, a one pound bag of dry pinto beans costs, on average, \$1.49 and will make 12 half-cup servings of cooked beans. A 15 oz. can of national brand pinto beans costs \$1.75, while a store brand can costs 88 cents, and each provides 3.5 half-cup servings. This means that a serving of pinto beans made from dry beans costs just 12.5 cents while a serving of store brand canned pinto beans costs 25 cents and the national brand costs 50 cents. A family of four that eats beans once a week could save nearly \$80 per year by choosing dry beans versus a national brand of canned beans.

### Convenience

**If you want to save time, cook with canned beans.**

While many people will find the cost savings of dry beans very appealing, they won't necessarily like the time and effort it takes to cook with them. It can take 3 to 24 hours—depending on soaking and cooking method—to sort, rinse, soak, and cook dry beans before you are ready to add them to a recipe, whereas cooking with canned beans is as easy as opening the can. If you or your patients value your time more than your money, using canned beans is the better option. With that said, you can also cook larger batches of dry beans, and then freeze for use in dishes like soups, stews, and chili thereby providing both the cost savings of dry beans *and* the convenience of a ready-to-use ingredient.

Type of Bean	Cost Per Serving*
Dry	\$0.125
Canned (store brand)	\$0.25
Canned (national brand)	\$0.50

\*Prices based on a supermarket price review conducted on January 5, 2012.

### Control

**If you want less sodium, cook with dry beans.**

A third issue to consider is the control you have when you start with dry beans, specifically over the amount of sodium in the final dish. A half-cup serving of pinto beans cooked from dry beans with no added salt is virtually sodium free while a half-cup serving of canned pinto beans contains approximately 200 milligrams of sodium. You can drain and rinse canned beans to remove about 40 percent of the sodium. You can also buy the lower sodium version of many canned bean products. But if you want to more carefully control the sodium in the final dish, you're better off starting with dry beans.

Finally, keep in mind that when cooking dry beans, it's best to not add salt or other ingredients that contain sodium until the beans are soft and fully cooked. The sodium can affect the beans' ability to fully cook and soften. 

#### About the Author

Amy Myrdal Miller, MS, RD, is director of programs and culinary nutrition at The Culinary Institute of America. She is also a member of the *Dry Bean Quarterly* editorial board.

