



Nutrition for Family Living

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April, 2009 Topics

How a Diet Rich in Fruits and Vegetables Might Aid in Bone Health

Addressing the Nutrition Education Needs of Older Adults

Materials Recently Added to the FLP Resource Database under WNEP

How a Diet Rich in Fruits and Vegetables Might Aid in Bone Health

By Gayle Coleman

Most people understand that calcium and vitamin D, along with physical activity, are important for strong bones. But research suggests that many other nutrients affect bone health. For example, the 2004 Surgeon General's report on bone health and osteoporosis explains how a wide array of nutrients and other food components (e.g., adequate boron, copper, fluoride, iron, isoflavones, magnesium, manganese, phosphorus, potassium, protein, vitamin C, vitamin K and zinc; avoiding too much caffeine, fiber, oxalates, phosphorus, protein, sodium and vitamin A) impact bone health. In addition to specific nutrients, there is increasing evidence that fruit and vegetables also play a role in building bone and keeping bones healthy.

A recent study suggests that the way fruits and vegetables affect the body's acid/base balance may have a role in bone health. Fruits and vegetables are metabolized to bicarbonate and therefore produce an alkaline environment in the body. Diets high in protein and cereal grains are "acidogenic" because they are metabolized to acid and therefore produce an acidic environment. In general, acidogenic diets tend to increase bone resorption, meaning that the bone tissues are being broken down faster than they are being re-formed.

One double-blind, controlled study of 162 men and women found that subjects taking bicarbonate for three months had the favorable effects of decreasing calcium excretion and lowering the biochemical marker of bone resorption, urinary N-telopeptide (NTX). Men and women 50 and older were randomized to one of four groups – placebo, potassium bicarbonate, sodium bicarbonate, or potassium chloride. The varied combinations of potassium and bicarbonate helped to determine whether the potassium, the bicarbonate or both were important to achieve effects on calcium excretion. All subjects also received 600 mg of calcium as triphosphate, a calcium supplement that would not affect acid/base balance, and 525 IU of vitamin D₃ daily. Weight and food frequency questionnaires were completed and analyzed at entry and at the end of the study. Twenty-four hour urinary NTX and calcium were measured at entry and after three months.

At baseline, the four groups did not differ significantly by age, body weight, sex distribution, dietary intake of calcium or vitamin D, or in baseline levels of urinary NTX or calcium excretion. After three months of treatment, there were no statistically significant changes among the four groups for weight or dietary intake of calcium or vitamin D. Bicarbonate affected the study outcomes and potassium did not. Therefore the two bicarbonate groups were combined in the final analysis.

Individuals in the bicarbonate treatment groups had a 13.4% decrease in urinary NTX compared with the no bicarbonate groups, indicating that there was less bone resorption in the bicarbonate treatment groups. The bicarbonate treatment groups also had significantly lower levels of urinary calcium.

Based on these results, the researchers suggested that increasing the alkali content of the diet may enhance bone health in healthy, older adults since the bicarbonate, but not the potassium, had a favorable effect on



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bone resorption and calcium excretion. They acknowledged that further research is needed to clearly define the effects of potassium and bicarbonate on bone turnover and bone health including longer-term effects. They also acknowledged that achieving alkali-producing diets through the combination of higher intakes of fruits and vegetables, and reduced intakes of cereal grains, would require major changes in the food choices of most American adults.

Implications for Extension Educators: Researchers are still sorting out the complex ways that our dietary patterns affect the health and strength of our bones (and our risk of developing osteoporosis some day). This study suggests that the alkaline environment produced by eating plenty of fruits and vegetables may be another contributing factor along with adequate intake of calcium, vitamin D, and weight-bearing physical activity to keep bones strong. Therefore, the results of this study may be one more reason to encourage people to heed the Dietary Guidelines for Americans advice to “focus on fruit” and “vary your veggies.”

References/resources:

Dawson-Hughes B, Harris SS, Palermo NJ, Castaneda-Sceppa C, Rasmussen HM, Dallai GE. Treatment with Potassium Bicarbonate Lowers Calcium Excretion and Bone Resorption in Older Men and Women. *J Clin Endocrinol Metab.* 2009;94(1):96-102.

Prynne CJ, Mishra GD, O'Connell MA, Muniz G, Laskey MA, Yan L, Prentice A, Ginty F. Fruit and vegetable intakes and bone mineral status: a cross-sectional study in 5 age and sex cohorts. *American Journal of Clinical Nutrition*, 2006;83:1420-8.

National Institute of Arthritis and Musculoskeletal and Skin Diseases. (2004). Bone Health: Other Nutrients and Bone Health at a Glance. Available online:
http://www.niams.nih.gov/Health_Info/Bone/Bone_Health/Nutrition/other_nutrients.asp



Addressing the Nutrition Education Needs of Older Adults

By Teresa Curtis

Nutrition education is a useful tool in the battle to prevent or improve nutrition-related chronic diseases. As the number of older adults in the US with nutrition-related chronic disease continues to rise, so does the importance of providing sound nutrition education. Nutrition professionals from the University of Georgia, North Carolina State University-Extension, Rutgers, the Centers for Disease Control, and a non-profit organization have reviewed current dietary and nutrition recommendations for older adults, compared these recommendations to practice, and summarized the implications for nutrition educators. According to the 2005 Dietary Guidelines for Americans, the diets of older adults do not meet recommendations for fruits and vegetables, potassium, B12, vitamin D, calcium, and fiber, but exceed recommendations for sodium and saturated fat. Older adults also have their own unique issues around hydration; weight-gain, obesity, and physical activity; hunger and food insecurity; and food safety. The following article discusses nutrition education opportunities that address the specific needs of older adults.

Dietary Guidelines with Special Implications for Older Adults

		2005 Dietary Guidelines	Current practice (Mean intake from food unless otherwise noted)	Source of current practice
Fruits and vegetables (servings/day)	Men, sedentary, 2,000 calories/day	> 9	5.7	Produce for Better Health Foundation (accessed 2007)
	Women, sedentary, 1,600 calories/day	> 7	4.7	
Whole grains (ounces/day)		3	1	USDHHS and USDA, 2005a; Cleveland et al. 2000
Saturated fat (percent calories)	Men	<10	11.5	*USDA, Agricultural Research Service 2007
	Women	< 10	11.1	
Sodium (mg/day)	Men	< 1,500	3,447	*USDA, Agricultural Research Service 2007
	Women	< 1,500	2,753	
Potassium (mg/day)	Men	4,700	2,911	*USDA, Agricultural Research Service 2007
	Women	4,700	2,372	
Vitamin B₁₂ (mcg/day)	Men	2.4	5.4	*USDA, Agricultural Research Service 2007
	Women	2.4	4.1	
Vitamin D (IU/day)	Men	1,000	212	Moore et al.,



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	Women	1,000	188	2005 (NHANES III 1988-94)
Milk as a source of calcium and other key nutrients (cups of milk/day)		3	~1	†Fulgoni et al, 2007 (NHANES 1999 – 2000)
Calcium (mg/day)	Men	1,200	821	*USDA, Agricultural Research Service 2007
	Women	1,200	724	
Fiber (g/day)	Men	30	16.2	*USDA, Agricultural Research Service 2007
	Women	21	14.0	
Physical Activity (percent of older Americans that get 30 minutes of moderate activity \geq 5 d/wk)		100	39	CDC/BRFSS 2005

*Nutrient intakes of older adults aged 60-69 years of age.

†Milk intake of adults aged 51 years and older.

Fruits and Vegetables: Most people are aware that fruits and vegetables are good sources of vitamins, minerals, fiber, and other disease fighting compounds. However, the idea of obtaining, preparing, and eating enough fruits and vegetables to meet the recommendations may seem daunting. The Senior Farmer's Market Nutrition Program may be a cost-effective and accessible option for low-income older adults to obtain produce. Nutrition educators can provide ideas and recipes for fruits and vegetables that are quick, easy, and appealing.

Whole Grain Foods: Whole grain foods are also good sources of fiber and various phytochemicals (non-nutritive plant chemicals). Fortified whole grain foods contain a crystalline form of vitamin B12, which is more easily absorbed in older adults. Older adults often lack the enzyme needed to absorb the complex form of B12 that occurs naturally in animal foods such as meat, eggs and milk. Barriers to including whole grain foods in the diet may include difficulty in identifying whole grain foods, taste, texture, length of preparation time, and lack of knowledge regarding the benefits of whole grain foods. Nutrition educators may be able to assist older adults in overcoming these barriers by addressing the benefits of whole grain foods, as well as providing information on identifying and preparing whole grain foods.

Milk & Other Dairy Products: Milk & other dairy products are excellent sources of calcium, potassium, vitamin D, and B12. Although there may be other reasons why older adults do not meet their recommended intake of milk and dairy products, lactose intolerance is one of the most common complaints. Lactose intolerant individuals may consider trying lactose-free or lactose-reduced milk, consuming small servings of milk or other dairy products several times daily, taking a lactase enzyme before eating or drinking dairy, or finding other appealing sources of calcium-rich foods, like calcium-fortified juice or sardines.

Sodium & Potassium: The effects of dietary sodium on blood pressure in older adults may be lessened by an increase in plant-based foods, which are rich in potassium. Salt added to processed foods contributes to approximately 77% of dietary sodium intake. One strategy to address high sodium diets is to provide nutrition education that improves the ability to identify the sodium content of prepared foods.

Hydration: With age comes a decreased ability to recognize thirst. This decreased thirst response makes older adults more susceptible to dehydration and constipation. To combat this issue, nutrition educators can emphasize the importance of drinking water and other sources of liquids, such as fruits and vegetables with a high water content, fruit juices, low sodium soups, coffee and tea.



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Overweight, Obesity, and Physical Activity: Aging is associated with increased weight gain, increased body fat and decreased skeletal muscle. The loss of muscle may be attributed to lower levels of physical activity, hormone changes, increased insulin resistance and, possibly, an increased need for dietary protein. A high fat mass promotes a biochemical imbalance that promotes insulin resistance and furthers muscle loss, which can increase one's risk of obesity and disability – both of which can be detrimental to a person's level of independence. Although discussions about weight loss are beyond the scope of WNEP, nutrition educators can provide strategies for improving overall diet quality and levels of physical activity, as described in the 2005 Dietary Guidelines for Americans.

Hunger and Food Insecurity: Lacking the ability to provide or access enough food to support one's self can lead to insufficient caloric intake, and insufficient amounts of vitamins and minerals in the diet. Inadequate dietary intake may eventually limit the ability to perform essential daily activities, such as preparing and eating food, bathing, or walking. Even marginal food insecurity can reduce the ability to perform daily duties and can prematurely age an individual by approximately 14 years. Nutrition educators can address food insecurity by informing older adults about local food resources and providing education on food budgeting.

Food Safety: As a person ages the immune systems work less effectively, the stomach produces fewer micro-organism-killing acids, and it takes longer for food to travel through the bowel. These factors, along with poor nutrition and decreased food intakes, make older adults more susceptible to the severe complications of foodborne illnesses. Older adults living in assisted living facilities, receiving home delivered meals, or dining at congregate meal sites may feel that they are not involved in food preparation or handling, but information regarding storing, reheating, and basic hygiene may improve food safety practices.

Implications for Extension Educators:

The research summarized above provides evidence of needs that Extension nutrition educators may consider as they plan age-appropriate, learner-centered programs for older adults in their communities.

Note: There will be a media release on this topic available from FLP in March 2009.

Reference:

Johnson, MA, Park S, Penn D, McClelland JW, Brown K, Adler A. 2008. Nutrition Education Issues for Older Adults. *The Forum for Family and Consumer Issues (FFCI)* 13(3). On-line:
<http://ncsu.edu/ffci/publications/2008/v13-n3-2008-winter/johnson-park-penn-mcclelland-brown-adler.php>

Educational Resources:

MyPyramid for Older Adults. Available from WNEP & EWBA resource database:
https://www.uwex.edu/ces/flp/apps/flrc/tch_res2/resourceDetails.cfm?rid=2120



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Materials recently added to the FLP resource data base under WNEP

- My Child, My Choices: Healthy Eating when You are Pregnant
https://www.uwex.edu/ces/flp/apps/flrc/tch_res2/resourceDetails.cfm?rid=3002

FLP and WNEP colleagues are encouraged to share this resource with WIC colleagues and other community partners who work with pregnant teens. FLP Specialists are developing lesson plans to accompany this booklet. If you are interested in being part of a small work group to provide input on these lesson plans or review them before they are finalized, please contact Susan Nitzke at Nitzke@nutrisci.wisc.edu by April 15, 2009.

Note: The Spanish version of this resource will be available later this spring or summer.