Chia seeds have become popular in the health foods market recently, despite the fact that they are actually one of the oldest staples of the Aztec and Mayan diets. Most supermarkets and health food stores sell chia seeds, but they can sometimes be difficult to locate in the store. They can often be found in the produce section or the baking section, however some stores may keep them with their specialty items such as next to the flaxseeds. Consumers are adding chia seeds to baked goods, breads, smoothies, or simply sprinkling on top of salads, cereals, and soups. Because of their mild flavor, chia seeds can be added to a wide variety of dishes. This article can help you learn more about chia seeds, and show you how to incorporate them into a balanced diet.

What are Chia Seeds?

Chia (Salvia hispanica L.) is a desert plant that was cultivated for centuries by the Aztecs of ancient Mexico. Chia seeds were a very important crop of the Aztec people, along with corn, as they incorporated these seeds into their daily diet. Salvia columbariae, a slightly different plant than that grown in ancient Mexico, can be found in California, Nevada, Arizona, and New Mexico. The Native American tribes of California used this variation of chia seeds as a source of food and for medicinal purposes. More recently, chia seeds are regaining the spotlight for their suspected nutritional benefits and have even been deemed a superfood.

Unique Properties of Chia Seeds

When chia seeds are added to water and allowed to sit for 30 minutes, they form a gel. (See Figure 1. Chia seeds) Chia seed gum, a slimy material, begins to form in the solution. The structural component responsible for their gelatinous quality in liquid is the water-soluble fiber of chia seeds. There is much interest in the characteristics of chia seeds and chia seed gum for use as a thickening or emulsifying agent in food products.
Nutritional Information and Health Benefits

Chia seeds are a rich source of healthy fats, dietary fiber, protein, and several minerals. The total calories in 1 tablespoon of chia seeds is 69 calories. (See Figure 2. Nutrition Facts Label) They also contain a high amount of antioxidants.6

Omega-3 Fatty Acids

Chia seeds are an excellent source of healthy polyunsaturated fats, especially omega-3 fatty acids, which are not made by the body and must be obtained from foods. The three main omega-3 fatty acids are: alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). ALA comes from plants, vegetable oils, nuts and seeds. EPA and DHA come from fish and fish oils. Our body converts ALA to EPA and DHA, which have the most potent health benefits (examples: reducing risk factors for heart disease, including high cholesterol and high blood pressure, and important roles in cognition and eyesight).7

Chia seeds contain approximately 26–35% oil by weight and have one of the highest known content of ALA.8 A tablespoon of chia seeds and walnuts contains approximately 2.5g of ALA, compared to ½ cup of tofu containing 0.4 to 0.7g ALA. The American Heart Association recommends consuming two servings of fish (4 ounces/serving) per week, which may provide 1.3-2.7g of ALA and approximately 500 mg of EPA and DHA.7,9

Fiber

One tablespoon of chia seeds provide a total of 5 grams of fiber, which contributes to the heart healthy nature of chia seeds. Soluble fiber, found in chia seeds, dissolves in water and passes though the digestive system more slowly than insoluble fiber. Soluble fiber with a healthy diet may help lower LDL (bad) cholesterol levels without lowering HDL (good) cholesterol.10

Protein

Chia seeds also provide 2 grams of protein per tablespoon, which is 4% of the daily recommended value (based on a 2,000 calorie diet). Protein provides amino acids that help in building and preserving body muscle and tissues. Inadequate protein intake in the United States is rare.

Minerals

Chia seeds are a rich source of several minerals, contributing significantly to the daily-recommended value of several of them. Containing 15% of the daily-recommended value of both magnesium and phosphorus, chia seeds are a good source of electrolytes, which regulate fluid and are important for muscle function. Calcium, typically obtained in the diet through foods like milk and cheese, is quite high in chia seeds. A milk based smoothie with an ounce of chia seeds mixed in would contain nearly 500 milligrams of calcium, about half of a typical adult’s calcium needs. (1 ounce of chia seeds provides 180mg of calcium and 1 cup of any types of milk provides 300 mg of calcium.) Stir-fry with some of calcium-rich vegetables, such as broccoli, bok choy (leafy Chinese cabbage), beans, and tofu and sprinkling of chia seeds at the end of the cooking could make a half of a daily target of 1,000 mg of calcium in adults. Zinc, a mineral commonly found in meats like beef and pork, is found in moderate amounts in chia seeds, making them a great source for vegetarians or vegans. Zinc plays a role in immune function, protein synthesis, and wound healing.11 Lastly, iron is found in moderate amounts in chia seeds, yet another nutrient typically found in meats.

Antioxidants

Recent studies have shown chia seeds are rich in antioxidants (phenolic compounds).6 Antioxidants are substances found in foods, which inhibit (“anti-”) a process called oxidation (“-oxidant”) in the body’s cells. Oxidation is a chemical reaction that produces free radicals. Free radicals cause destruction of our body’s cells and antioxidants stop them. Studies have shown antioxidants reduce the risk of heart disease and cancer.12

The phenolic compounds found in chia seeds may decrease the invasiveness of cancer cells and improve the clinical outcomes.6

Figure 2. Chia seed Nutrition Facts (based on 1 Tablespoon, raw)
Reference: USDA, SuperTracker, Food-A-Pedia
Where to Purchase and the Cost
Chia seeds can be purchased in most major grocery stores and warehouse stores such as Fry’s, Safeway, Albertson’s, Costco, and Sam’s Club. They can also be purchased at specialty foods stores such as Trader Joe’s and Sprouts. Chia seeds can often be found in the produce section or the baking section, however some stores may keep them with their specialty items such as next to the flaxseeds.

Chia seeds, like olive oil, tend to be on the higher end in price, but a little goes a long way. A 12-ounce bag of chia seeds typically costs about $9-12, but contains approximately 30 servings, 1 tablespoon each. That means that each serving of chia seeds costs $0.30-0.40.

Suggested Uses and Recipes
It is very simple to add chia seeds to smoothies or juices, which is a great option to boost the nutritional value of your drink. A popular way to consume chia seeds is to simply add them to water with a splash of lemon or lime juice: this is called Chia Fresca (Figure 3. Chia Fresca). Mix 12 ounce cold, drinking water, 2-3 tablespoons of lemon juice, 1-2 teaspoons chia seeds and let it sit for about 5 minutes. Add sweeteners, if you desire. First, make simple syrup – dissolve sugar in boiling water, then add to your Chia Fresca.

There are several ways to incorporate chia seeds into baking, as well, with many recipes available online. Below simple and quick recipes are introduced.

Lemon Chia Seed Muffins

**Ingredients:**
- 12 muffins, 2” diameter
- 1 ¾ cups all-purpose flour
- ¾ cup granulated sugar
- 2 teaspoons baking powder
- ¼ teaspoon salt
- ¾ cup part-skim ricotta cheese
- ½ cup water
- ¼ cup light olive oil
- Zest of 2 lemons
- 3 tablespoons fresh lemon juice
- 1 egg
- 2 teaspoons chia seeds
- Cooking Spray

**Directions**
1. Preheat oven to 375°F. Line a standard muffin pan with cupcake liners and lightly coat with cooking spray.
2. In a large bowl, whisk together the flour, sugar, baking powder, and salt.
3. In a separate bowl, mix together ricotta cheese, water, olive oil, lemon zest, and egg. (Careful not to overmix the ingredients. Avoid making a tough muffin!)
4. Make a well in the center of the dry ingredients, pour the wet ingredients into the middle, then mix together with a wooden spoon.
5. Next, add the chia seeds and gently fold into batter.
6. Evenly divide the batter into prepared muffin pan using a large scoop.
7. Bake for 16 minutes or until a toothpick inserted in the middle comes out clean.
8. Allow to cool completely and then store in an airtight container for up to 5 days.

**Per Serving:**
- 149 calories, 2.5g Total Fat, 28g Carbohydrates, 4.4g Protein, 1g Fiber

**Estimated Total Cost:**
$4.52, Cost per Serving: $0.38
**Fresh Berry Chia Seed Jam**

### Ingredients:
- 1 Tablespoon, 15 servings
- 1 cup berries (Use fresh berries when in season, and use frozen in the off season. If you are using fresh berries, wash before using them!!)
- 1 tablespoon chia seeds
- 1 tablespoon warm water
- ½ tablespoon honey
- ½ tablespoon granulated sugar
- 1 teaspoon vanilla

### Directions
1. Combine all ingredients in a food processor or blender and mix to desired consistency.
2. Place in airtight container and refrigerate for 60 minutes before serving.

### Per Serving:
- 18 calories, 0.3g Total Fat, 4g Carbohydrates, 0.2g Protein, 1g Fiber

### Estimated Total Cost:
$4.35, Cost per Serving: $0.44

### References
7. Fish and Omeg-3 Fatty Acids. American Heart Association. Available at: http://www.heart.org/HEARTORG/GettingHealthy/NutritionCenter/HealthyEating/Fish-and-Omega-3-Fatty-Acids_UCM_303248_Article.jsp#.ViGii0ivG9sk

### Abstract
Chia seeds are a popular food lately; which people have deemed as a superfood. Chia seeds are rich source of many vitamins and minerals as well as omega-3 fatty acids and fiber. This article explores the history of chia seeds, the nutritional benefits, as well as illustrates some ways to include this food into your diet.
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