

Oats for You

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Abstract: With respect to baby food and other foods, there is a current scare about the arsenic in rice. The objective of the current work is to suggest oats as a possible substitute for rice. Oats could be a viable substitute because it thrives on land, which is typically poor, which is not as fertile as the river valleys ideal for rice. In addition, the preparation of instant oats takes three minutes or so in a microwave oven, compared to five to seven times the length required to boil white rice, and maybe three more times as long again for brown rice. In this day and age of dual working couples, it is a boon to have easy recipes which take minimal time to prepare, and yet nutritious and free of preservatives. The health benefits of oats have also been the focus in the literature review.

Keywords: Corn, Wheat, Rice, Grains, Arsenic, Baby food, T2DM.

1. BACKGROUND

There is a scare about arsenic in rice, especially in baby food [1]. On the first day of April 2016, the United States Food and Drug Administration (USFDA) published facts and figures about its assessment of this naturally-occurring element in rice and products derived from rice. A large baby-food manufacturer has posted a letter in April 2016 about its products [2], and urging parents to feed their babies a variety of foods, which may include rice but also a diversity of other grains. The scare is because rice is the only grain that actually uptakes arsenic from the soil and water (into its grain) in which the rice plant is growing [3]. However, the adverse effect of arsenic in rice for daily rice consumers, if any, has not been scientifically determined in a broadly applicable manner. In [3], it was systematically deduced that the blood pressure of daily consumers of rice may be slightly elevated compared to non-consumers, even though the extent of the elevation has not been determined.

Oats, *Avena sativa*, are a hardy grain that can thrive in relatively meager soil where other crops cannot grow. After harvesting and cleaning, oats are roasted. The roasting helps impart their characteristic flavor. The hull is then removed, which does not remove any of their bran and germ. Hence, the preparation of oats maintain their nutrients and fiber.

Literature survey done on this topic revealed a slew of health benefits derived from consuming oats. Hence, the next section is focused on that topic. The last two small sections look at the economics of oat agriculture and its viability as a staple food if the demand for oats increases.

2. HEALTH BENEFITS OF OATS

Because of their substantial fiber content, oats do its part in eliminating cholesterol from the digestive system [4]. In other words, oats reduce the dietary cholesterol content of food intake.

Antioxidants exclusive to oats, avenanthramides, help prevent free radicals from damaging low-density lipoprotein (LDL) cholesterol, hence cutting down the risk of cardiovascular disease, as found in reference [5]. Owing to their high beta-glucan content, oats are a heart-healthy food. Furthermore, they possess greater than 20 distinctive polyphenols, avenanthramides, which have demonstrated vibrant antioxidant action *in vitro* and *in vivo* [6]. The sole author of [6], Meydani, had also researched about the modulation of cardiovascular disease [7].

In [8], researchers exposed human arterial wall cells to refined avenanthramides from oats for a whole day, and established that these oat phenols greatly repressed the formation of some types of molecules that participated in the layering of monocytes (immune cells in the bloodstream) to the arterial wall—the step that initiates atherosclerosis.

Heart failure is the main cause of hospitalization among the seniors in the United States [9]. Drug treatment provides only limited success (angiotensin-converting-enzyme (ACE) inhibitors and beta-blockers are normally used; no proof has been found that statins are suitable for heart failure), and its predicted future is not good. Monitoring of 2445 discharged hospital patients with heart failure revealed that about thirty-seven percent passed away in the first year, and over seventy-eight percent passed on inside of five years [9,10].

Consumption of whole grain products and dietary fiber has been shown to cut down the risk of high blood

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pressure and heart attack [11]. Harvard scholars studied the effects of cereal consumption on heart failure risk and monitored 21,376 participants in the Physicians Health Study for about twenty years. After correcting for factors (smoking, alcohol consumption, age, vegetable consumption, vitamin use, exercise, and history of heart disease), the researchers discovered that men who appreciated a daily bowl of whole grain (unrefined) cereal for breakfast had a twenty-nine percent less risk of heart failure [11].

The discovery of reference [12] was that for a postmenopausal woman with high cholesterol, elevated blood pressure and other symptoms of cardiovascular disease (CVD), her condition would improve if she ate servings of whole grains weekly, such as oats, preferably spread over different days. That 3-year prospective study of over 200 postmenopausal women with CVD discovered that the women who ate at least 6 servings of whole grains weekly noticed:

- (1) Decelerated advance of atherosclerosis, the build-up of plaque that constricts the blood vessels.
- (2) Less advance in stenosis, the reduction of radii of the arteries.

Research has also shown that beta-glucan has advantageous effects in diabetes as well. People with Type 2 Diabetes Mellitus (T2DM) and ate foods high in oat fiber or oatmeal or oat bran were found to have less upsurges in postprandial blood sugar as contrasted to the cohort fed with white rice or white bread [13,14].

“Oats and other whole grains are a rich source of magnesium, a nutrient that behaves as a co-factor for more than three hundred enzymes, including enzymes involved in the body's use of glucose and insulin secretion” [4].

The U.S. Food and Drug Administration (FDA) allows foods that have 51% whole grains or more by weight (and additionally low in fat, saturated fat, and cholesterol) to be advertised with a health note claiming consumption is connected to lower risk of heart disease and some kinds of cancers. Studies also deduced that regular ingestion of whole grains brings down the risk of T2DM [13-15]. Foods that are positive risk factors for T2DM include sugar and wheat (with gluten) [16,17]. In the eight-year study period [18], with over 41,000 participants of the Black Women's Health Study, research data clearly indicated inverse relations between magnesium, calcium and major food sources (including oats) and deterioration in T2DM disease.

Researchers examined the quantity of fiber eaten by almost thirty six thousand participants in the United Kingdom Women's Cohort Study [18]. They concluded that a diet rich in fiber from whole grains, such as oats, and fruit proffered substantial protection against breast cancer for young (pre-menopausal) women [18]. Young women who consume the most fiber (>30 grams daily) more than halved their risk of breast cancer, contrasted to females whose diets supplied the least fiber (< 20 g/day). Fiber supplied by whole grains offered the most protection. Young women who consumed the most whole grain fiber (at least 13 g/day) had a 41% reduced risk of breast cancer, compared to those with the lowest whole grain fiber intake (4 g or less per day). Fruit fiber also provided protection. Young females whose diets supplied the most fiber from fruit (at least 6 g/day) had a 29% reduced risk of breast cancer, compared to those with the lowest fruit fiber intake (2 g or less per day).

As shown in Table 1, it is straightforward to put together a menu plan that proffers 13 grams of whole grain fiber and 6 grams of fruit fiber daily.

Table 1: Sample Foods and Fiber Content, Mateljan [4]

Food	Fiber Content in Grams
Oats, 1 cup	3.98
Whole wheat bread, 1 slice	2
Whole wheat spaghetti, 1 cup	6.3
Brown rice, 1 cup	3.5
Barley, 1 cup	13.6
Buckwheat, 1 cup	4.54
Corn, 1 cup	4.6
Apple, 1 medium with skin	5.0
Banana, 1 medium	4.0
Blueberries, 1 cup	3.92
Orange, 1 large	4.42
Pear, 1 large	5.02
Prunes, 1/4 cup	3.02
Strawberries, 1 cup	3.82

As a consideration to peoples who consume rice daily, including the residents of China, India and all of Southeast Asia and the rest of East Asia, the following meal plan strategy could be used. Rice is a major dietary grain in the United States of America also. The number of rice consumers in South America, as well as the Middle East, is not insignificant either. So instead of

eating 2 or 3 meals of rice a day, one can switch to eating 1 or 2 meals of oats a day, and retain 1 meal of rice. Oats has no gluten. The gluten grains are wheat, rye and barley, and should be avoided as much as possible, even by people without celiac disease. Oats (instant or otherwise) with or without fruits, and certainly without sugar, is a good and hearty breakfast. An egg and a hot beverage, tea or coffee, will round-up a filling and nutritious breakfast.

3. FACTS ABOUT OAT PRODUCTION

Oats are usually grown in spring and early part of summer. Oats can tolerate cold temperatures; it can produce well at lower temperatures.

As of 2008 [19], the latest year that oats reported a record crop in the USA was in 1945, with 42 million acres producing 1.5 billion bushels of oats. In 2005, no more than five million acres were planted with oats in the USA, about 10% of the size of 1945's peak harvest.

About half of the reaped oats are used for grains, and the remainder used for hay. In the USA, oat is mostly grown in the Midwest, with the Dakotas, Wisconsin, Minnesota and Iowa featuring as the top growers. Each acre of land produces about 100 bushels of oats.

4. ISSUES THAT AFFECT OAT PRICES

The price of oats is influenced by the following factors:

- (1) Oats are hearty and can be found in different climate types around the world. Fruitful crops have been produced in Iceland and Northwest Europe. Oats are resilient to cool, wet summers and incline to lie dormant under high temperatures.
- (2) Standards have been set for oat quantities in food products by the Food and Drug Administration (FDA) [20]. For a product to be claimed as helping to reduce the risk of heart disease, a specified smallest amount must be in the product. It is necessary for the food product to have a minimum of 0.75 gram of soluble fiber in each serving.
- (3) Oats have a seemingly unrealized commercial potential. Oats share a similar protein profile with soybeans. With a protein range of 12-24%, oats have been proclaimed by the World Health Organization (WHO) to be comparable in quality to milk, meat, and egg proteins.

5. DISCUSSION AND CONCLUSION

Oats offer noteworthy health benefits. However, with the rising attractiveness of corn and soybeans, especially in ethanol production, oats are not increasing in popularity in the market place. The previous two sections certainly tells of a huge potential for the oats market to grow.

It is possible that the health benefits of oats consumption has not been advertised enough. It is a cereal and a carbohydrate staple that can be consumed for heart-health, as well as to avert metabolic syndrome among the senior population all over the world. Additionally, the risk factors for T2DM and breast cancer can be reduced with the regular consumption of oats or oat food products. Its characteristic taste is very pleasant, and easy to get used to. Oat porridge can be made to duplicate the range of consistency of rice porridge. Since rice and rice products are consumed in many regions of the world, the potential for growth of oats consumption could be quite large.

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This paper is dedicated to all those who depend on rice as a staple grain, and need a substitute because the 'arsenic' scare may have some basis, however small. Additionally, it is also specifically dedicated to weaning babies.

REFERENCES

- [1] USFDA. Questions & Answers: Arsenic in Rice and Rice Products. April 1, 2016. Retrieved 5/12/16. <http://www.fda.gov/Food/FoodbornellnessContaminants/Metals/ucm319948.htm>
- [2] Gerber. Dear Gerber Families, April 1, 2016. Retrieved 5/13/16. <https://www.gerber.com/why-gerber/gerber-arsenic-rice-cereal-safety?gclid=CN-X55ns1swCFU0vgQod1r8Gew>
- [3] Wong KV. Rice consumption and hypertension. *J Epidemiol Public Health Rev.* 2016; 1(1): Sciforschen publishers.
- [4] Mateljan G. Oats. The world's healthiest foods. Retrieved 04/05/16. <http://www.whfoods.com/genpage.php?tname=foodspice&dbid=54>
- [5] Chen CY, Milbury PE, Kwak HK, Collins FW, Samuel P, Blumberg JB. Avenanthramides and phenolic acids from oats are bioavailable and act synergistically with vitamin C to enhance hamster and human LDL resistance to oxidation. *J Nutr.* 2004; 134(6): 1459-66.
- [6] Meydani M. Potential health benefits of avenanthramides of oats. *Nutr Rev.* 2009; 67(12): 731-5. <http://dx.doi.org/10.1111/j.1753-4887.2009.00256.x>
- [7] Meydani M. Vitamin E modulation of cardiovascular disease. *Ann NY Acad Sci.* 2004; 1031(1): 271-9. <http://dx.doi.org/10.1196/annals.1331.027>
- [8] Liu L, Zubik L, Collins FW, Marko M, Meydani M. The antiatherogenic potential of oat phenolic compounds. *Atherosclerosis* 2004; 175(1): 39-49. <http://dx.doi.org/10.1016/j.atherosclerosis.2004.01.044>

- [9] Goldberg RJ, Ciampa J, Lessard D, Meyer TE, Spencer FA. Long-term survival after heart failure: a contemporary population-based perspective. *Arch Intern Med.* 2007; 167(5): 490-6.
<http://dx.doi.org/10.1001/archinte.167.5.490>
- [10] Christ M, Klima T, Grimm W, Mueller HH, Maisch B. Prognostic significance of serum cholesterol levels in patients with idiopathic dilated cardiomyopathy. *Eur Heart J.* 2006; 27(6): 691-9.
<http://dx.doi.org/10.1093/eurheartj/ehi195>
- [11] Djousse L, Gaziano JM. Alcohol consumption and heart failure in hypertensive US male physicians. *Am J Cardiol.* 2008; 102(5): 593-7.
<http://dx.doi.org/10.1016/j.amjcard.2008.04.031>
- [12] Erkkila AT, Herrington DM, Mozaffarian D, Lichtenstein AH. Cereal fiber and whole-grain intake are associated with reduced progression of coronary-artery atherosclerosis in postmenopausal women with coronary artery disease. *Am Heart J.* 2005; 150(1): 94-101. PMID: 16084154.
<http://dx.doi.org/10.1016/j.ahj.2004.08.013>
- [13] Braaten JT, Scott FW, Wood PJ, Riedel KD, Wolynetz MS, Brule D, et al. High β -glucan oat bran and oat gum reduce postprandial blood glucose and insulin in subjects with and without type 2 diabetes. *Diabet Med.* 1994; 11(3): 312-8.
<http://dx.doi.org/10.1111/j.1464-5491.1994.tb00277.x>
- [14] Tapola N, Karvonen H, Niskanen L, Mikola M, Sarkkinen E. Glycemic responses of oat bran products in type 2 diabetic patients. *Nutr Metabol Cardiovasc Dis.* 2005; 15(4): 255-61.
<http://dx.doi.org/10.1016/j.numecd.2004.09.003>
- [15] van Dam RM, Hu FB, Rosenberg L, Krishnan S, Palmer JR. Dietary calcium and magnesium, major food sources, and risk of type 2 diabetes in U.S. Black women. *Diabet Care* 2006; 29(10): 2238-43. PMID: 17003299.
<http://dx.doi.org/10.2337/dc06-1014>
- [16] Wong KV. Stresses caused by too much wheat and sugar. *Glob J Immunol Allerg Dis.* 2015; 3(1): 6-10.
<http://dx.doi.org/10.14205/2310-6980.2015.03.01.2>
- [17] Wong KV. A perspective of one important risk factor of type 2 diabetes in hispanic and Asian minorities. *Glob J Immunol Allerg Dis.* 2015; 3(1): 1-5.
<http://dx.doi.org/10.14205/2310-6980.2015.03.01.1>
- [18] Cade JE, Burley VJ, Greenwood DC. Dietary fibre and risk of breast cancer in the UK Women's Cohort Study. *Int J Epidemiol.* 2007; PMID: 17251246.
- [19] DraKon N. Commodities: Oats. Investopedia. Retrieved 04/06/16. <http://www.investopedia.com/university/commodities/commodities13.asp>.
- [20] U.S. Code of Federal Regulations. Title 21-Food and Drugs. Retrieved 5/12/16. <https://www.gpo.gov/fdsys/pkg/CFR-2012-title21-vol2/xml/CFR-2012-title21-vol2-chapl.xml>.

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