

Does Wheatgrass Juice Oxygenate the Blood of Resting Individuals?

M Pascuzzi, C Chambers

Citation

M Pascuzzi, C Chambers. *Does Wheatgrass Juice Oxygenate the Blood of Resting Individuals?*. The Internet Journal of Alternative Medicine. 2008 Volume 7 Number 2.

Abstract

Clinical studies in the medical research literature strongly suggest that ingesting wheatgrass juice can help the body to heal from many diseases. While no studies have attempted to explain why wheatgrass juice has clinically proven benefits, many of the studies hypothesize that wheatgrass juice increases the oxygenation of the blood (and this leads to removal of toxins and increased cellular health). We have administered two ounces of pure wheatgrass juice to 30 resting adults and monitored the blood oxygen level using a pulse oximeter.

INTRODUCTION

Crested wheatgrass (*Agropyron Cristatum*, (L) Gaertn, Poaceae) is a type of cereal grass that is commonly used as a dietary supplement because of its nutritional value. ¹ Many grasses have been identified as complete foods meaning that all known nutrients are found in them. They also contain many phytochemicals that are collectively labeled the grass juice factor. ¹ There have been many studies done on barley juice that suggest it can strengthen the immune system. Wheatgrass is believed to have benefits similar to that of barley juice due to the grass juice factor. ¹ Both wheatgrass and barley juice have been shown to have health benefits when ingested by animals and humans. ¹²³⁴⁵⁶¹²¹³¹⁴¹⁵¹⁶¹⁷²²²³²⁴²⁵²⁶²⁷ Barley grass has been shown to have anti-ulcer action. ² Beta-carotene, which the body converts to Vitamin A, is contained in wheatgrass and has been shown to increase the immune response of rats. ³

The nutritional value of wheatgrass has been shown to be greater than many other common foods. One study on wheatgrass showed it contains more threonine, isoleucine, phenylalanine, arginine, alanine, aspartic acid, glutamic acid, and prolin per 100 grams than spinach, broccoli, eggs, and chicken. ¹ Consuming wheatgrass is equivalent to eating a large amount of vegetables. ¹ It has been shown that the risk of colon cancer increases as the amount of vegetables eaten decreases. ⁴ Leafy vegetables are also associated with a lower overall cholesterol. ⁵ Research has shown that carotene from green and yellow vegetables may act as an inhibitor of carcinogens. ⁶ One study showed that increasing carotene

intake decreased cancer risk. ⁶

Wheatgrass has been used for many years. In the 1940s cereal grasses were the United States' best selling multiple vitamin. ¹ This was largely due to the persistence of one of wheatgrass's pioneers, Charles Franklin Schnabel. ¹ Schnabel was a chemist and agriculturalist who spent his life promoting the nutritional benefits of wheatgrass after noticing the amazing results some of his livestock experienced on a cereal grass diet. ¹ Another pioneer of wheatgrass was Ann Wigmore. ¹ Wigmore opened the Hippocrates Health Institute in Boston to distribute wheatgrass to the sick. ¹ She also opened living food programs in several other countries. ¹ Man made multiple vitamins eventually replaced some of the wheatgrass tablets sold in health food stores, but wheatgrass juice is still used by many people today. ¹ The Optimum Health Institute still uses wheatgrass as part of their three week program that promotes the purification and detoxification of the body. ⁷

Some commonly claimed benefits of wheatgrass juice are that it can be used to treat or supplement treatment for ulcerative colitis, beta-thalassemia, burns, and suppurating wounds. ⁸⁹¹⁰¹¹ One study indicated that wheatgrass juice can be used to treat individuals with active restricted left colon ulcerative colitis with generally few side effects. ¹⁰ Marwaha et al analyzed progress of patients with Thalassemia Major who grew wheatgrass in their homes and drank it daily. ⁸ In their study half of the patients saw a decrease in more than 25% of the amount packed red blood cells required. ⁸

Wheatgrass is a potential treatment for burns. One study showed that adding chlorophyll to Bi Ointment decreased the amount of time second degree spot and third degree burns took to heal.⁹ Grasses such as wheatgrass are one of the best sources of chlorophyll.¹ It is the chlorophyll content of wheatgrass that is believed to treat suppurating wounds as well.¹² Clinical studies suggest that chlorophyll has a bacterostatic property possibly due to its ability to break down carbon dioxide and release oxygen.¹²¹³¹⁴ Studies have shown that chlorophyll can be used as a treatment for different types of ulcers.¹⁵¹⁶ In the 1930s Hughes and Latner found that certain amounts of chlorophyll could help rabbits that were made anemic through hemorrhages recover in a faster amount of time.¹⁷

Common “claims” can be found suggesting that wheatgrass lowers blood pressure, purifies the liver, heals wounds and sores, builds muscle and endurance, and treats cancer.¹⁸¹⁹²⁰²¹ There are several suggested ways that wheatgrass may inhibit cancer. One is that wheatgrass acts as an inhibitor of carcinogens.²⁰ Wheatgrass has been shown to inhibit the effect of carcinogens that require metabolic activity.²²²³ A second possibility is that wheatgrass may fight cancer due to the combination of enzymes it contains. It has been suggested that these enzymes can help dissolve tumors.²⁰ Another possible reason that wheatgrass can fight cancer is that it increases the amount of oxygen in the blood.²⁰ Many of the other benefits of wheatgrass juice could also be explained if wheatgrass did oxygenate the blood. This theory was also suggested by Chernomorsky and Segelman.²⁴ They stated that chlorophyll derivatives may promote wound healing via a mechanism similar to subsequent cell regeneration with simultaneous increased oxygen uptake. This suggests that chlorophyll derivatives may increase the amount of oxygen present in the blood stream.²⁴ Since wheatgrass is one of the best sources of chlorophyll, it is possible that when ingested, wheatgrass causes an increase in the amount of oxygen in the blood.

MATERIALS AND METHODS

PARTICIPANTS

Thirty individuals, 21 female and 9 male, volunteered to participate in the study. The population ranged from age 18 to 51, with a mean, median, and mode of 21, 20, and 21, respectively. No age or gender limitations were applied to the study in order to maintain applicability to the general population. Subjects were recruited via word-of-mouth. In order to participate, individuals were required to sign an

informed consent and a questionnaire regarding diet and exercise habits before each trial. Individuals were permitted to participate if they were non-smokers, exercised regularly, had never taken blood thinners, and had no allergies to foods similar to wheatgrass. The study was approved for use of human subjects by the Mercyhurst College Institutional Review Board.

METHODOLOGY

Wheatgrass. Wheatgrass kits were purchased from www.wheatgrasskit.com (Springville, UT). Each kit included five 53 cm x 25 cm black plastic growing trays, five 0.45-kg bags of organic wheatgrass seed, two bags of organic growing mix (animal-free forest based compost), and azomite, an organic fertilizer full of minerals and trace elements.

Seeds were rinsed twice then soaked in tap water for one to two days prior to being planted. Organic soil was poured into a growing tray until it was evenly 2.5 cm thick, then a handful of azomite was sprinkled over it. The pre-soaked seeds were evenly distributed over the fertilized soil and covered with newspaper. The newspaper was sprayed with water until it soaked through the soil. The newspaper and soil were watered likewise each day until the grass was about 5 cm. The newspaper was removed and the grass was set under a growing light that was turned on and off every 12 hours.

The wheatgrass was ready to be juiced once it was 15-20 cm tall. A commercial wheatgrass juicer (Miracle Pro Green Machine Wheat Grass Juicer, Model MJ575) was used to produce a 2-oz (59-mL) serving of juice. If the juice was consumed within one hour, it remained fresh. Otherwise, it was frozen and thawed immediately prior to consumption.

Monitoring blood oxygenation levels. A BCI® 3303 Hand-Held Pulse Oximeter with an Adult Finger Sensor and Polar® F4 heart rate monitor with a T31 transmitter were used to measure the SpO₂ and heart rate, respectively, of each participant. The sensor was placed on the finger and SpO₂ was measured as the participant sat in order to observe the participant’s resting SpO₂ level. Data were collected every thirty seconds for 15 minutes prior to drinking wheatgrass juice. After the participant drank the wheatgrass juice, SpO₂ and heart rate were collected every thirty seconds for an additional 35-75 minutes.

DATA ANALYSIS

The pulse-oximeter recorded the percent oxygenation level

every thirty seconds for fifteen minutes. Using this data we obtained an average pre-ingestion oxygenation, \bar{x}_i , level for each participant, where i is the participant number.

Figure 1

$$\bar{x}_i = \frac{\sum_{j=1}^{30} x_{ij}}{30} \quad (1)$$

We then compared post-consumption wheatgrass data with the average pre-ingestion values for each participant every 30 seconds, for 35-75 minutes post-consumption of the wheatgrass juice.

Figure 2

$$\Delta x_k = x_k - \bar{x}_i \quad (2)$$

If wheatgrass juice were oxygenating the blood, one would expect positive values for Δx_k . If it had no effect, one would expect Δx_k values near zero.

Individual results were scattered. In order to generate a single set of data that represents an average deviation from a personal blood oxygenation level, we then averaged all participant (i) Δx_k values at each time step post-wheatgrass juice consumption.

Figure 3

$$y_k = \frac{\sum_{i=1}^{30} \Delta x_k}{30} \quad (3)$$

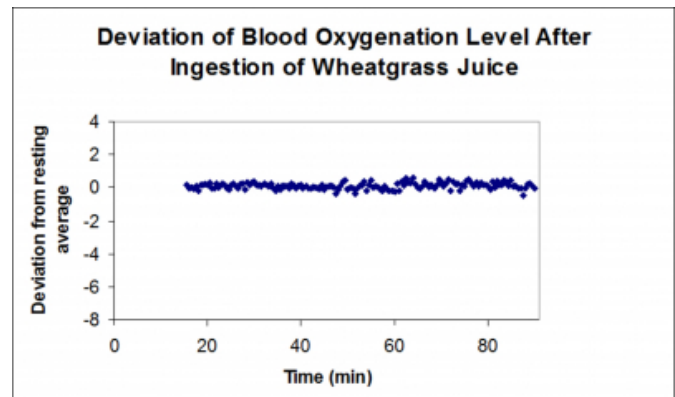
Where k represents the data collected every 30 seconds. The set of values represents the deviation in SpO_2 for the entire set of 30 participants from their personal resting average value of SpO_2 .

RESULTS

Figure 1 shows the deviation of blood oxygen levels after the ingestion of wheatgrass juice.

Figure 4

Figure 1: Deviation of SpO_2 level after ingesting wheatgrass juice as compared to before ingestion.



A linear fit of this data yields a slope of 0.0032% oxygenation/minute. Wheatgrass juice does not significantly oxygenate the blood within 75 minutes of ingestion for resting, healthy participants.

It is possible that exercising participants would show a change in blood oxygenation level upon ingesting wheatgrass juice or that blood oxygenation changes during a longer time frame. Our study was designed to test a commonly suggested, but unreferenced, “benefit” of wheatgrass juice. The results of our small study indicate that ingesting wheatgrass juice does not lead to an increase in blood oxygenation levels within 75 minutes for resting, healthy participants.

ACKNOWLEDGEMENTS

The authors are thankful to the Mercyhurst College Research Assistant Program for providing financial support for the project.

References

1. Meyerowitz S. Wheat Grass Nature's Finest Medicine: The Complete Guide to Using Grasses to Revitalize Your Health. 6th ed. Great Barrington, Mass: Sproutman Publications; 1999.
2. Hidetoshi O, Hideo Y, Chiseko K, Tetsuji M, Yoshihide H, Kazuhiko K. Studies on the Constituents of Green Juice from Young Barley Leaves. Antiulcer Activity of Fractions from Barley Juice. J Pharm Soc of Japan 1985; 105: 1046-1051.
3. Bendich A, Shapiro S. Effect of Beta-Carotene and Canthaxanthin on the Immune Responses of the Rat. J Nutr. 1986; 116: 2254-2262.
4. Graham S, Dayal H, Swanson M, Mittelman A, Wilkinson G. Diet in the Epidemiology of Cancer of the Colon and Rectum. J Nat Canc Inst. September 1978; 61(3): 709-714.
5. Fraser G E, Jacobs D R, Anderson J T, Foster N, Palta M, Blackburn H. The Effect of Various Vegetable Supplements on Serum Cholestrol. Am J Clin Nutr. July 1981; 34: 1272-1277.

6. Colditz G A, Branch L G, Lipnick R J, et al. Increased Green and Yellow Vegetable Intake and Lowered Cancer Deaths in an Elderly Population. *Am J Clin Nutr.* January 1985; 41:32-36.
7. OHI Program. Optimum Health Institute Page [Internet]. San Diego (CA): Optimum Health Institute; [updated 2007; cited 2007 Jul 2]. Available from: <http://www.optimumhealth.org/OptimumHealth/OhiProgram/ohiprogram.htm>. (Accessed 2009 May 11).
8. Marwaha R K, Deepak B, Siftinder K, Amita T. Wheat Grass Juice Reduces Transfusion Requirement in Patients with Thalassemia Major: A Pilot Study. *Indian pediatr.* July 17, 2004; 41: 716-720.
9. Collings G. Chlorophyll and Adrenal Cortical Extract in the Local Treatment of Burns. *Am J Surg.* 1945; 70: 58-63.
10. Ben-Ayre, G E, Wengrower D, Stamper A, Kohn R, Berry E. Wheat Grass Juice in the Treatment of Active Distal Ulcerative Colitis: A Random Double-Blind Placebo-Controlled Trial. *Scand J Gastroenterol.* 2002; 37: 444-449.
11. Gruskin B. Chlorophyll-its Therapeutic Place in Acute and Suppurative Disease. *Am J Surg.* 1940; 49: 49-55.
12. Gruskin B. Chlorophyll-Its Therapeutic Place in Acute and Suppurative Disease. *Am J Surg.* 1940; 49(1): 49-55.
13. Smith L W. Chlorophyll: An Experimental Study of its Water-Soluble Derivatives. *Am J Med Sci.* 1944; 207: 647-654.
14. Smith Lawrence W. The Present Status of Topical Chlorophyll Therapy. *NY State J Med.* July 15,1955; 2041-2049.
15. Carpenter E B. Clinical Experiences with Chlorophyll Preparations. *Am J Surg.* February 1949; 77: 167-171.
16. Offenkrantz W G. Water-Soluble Chlorophyll in the Treatment of Peptic Ulcers of Long Duration. *Rev Gastroenterol.* 1950;17: 359-367.
17. Hughes J H, Latner L. Chlorophyll and Hemoglobin Regeneration After Hemorrhage. *J Physiol.* 1936; 86: 388-395.
18. The Miracle of Wheatgrass. The Creative Health Institute Page [Internet]. Union City (MI): Creative Health Institute; [cited 2007 Jul 3]. Available from: <http://www.creativehealthinstitute.us/wheatgrass.htm>. (Accessed 2009 May 11).
19. Wheat Grass – Barley Green / Barley Grass - Cereal Grass. The Green Food Products Micro Algae and Cereal Grass Page [Internet]. [updated 2002; cited 2007 Jul 3]. Available from: <http://www.health-info.org/food%20cure/greenalgae.htm>. (Accessed 2009 May 11).
20. The Wonders of Wheatgrass. SoyQuick Wheatgrass Juice Page [Internet]. [cited 2007 Jul 3]. Available from: <https://www.soyquick.com/wheatgrassjuice.html>. (Accessed 2007 Jul 3).
21. Athletes Take Note. Pines International, Inc. The Wheat Grass People Page [Internet]. Lawrence (KS): Pines International, Inc.; 1994 [updated 2008; cited 2007 Jul 3]. Available from: <http://www.wheatgrass.com/faq/factsheets/athletesfactsheet.php>. (Accessed 2009 May 11).
22. Chiu-Nan, L. Chlorophyll: The Active Factor in Wheat Sprout Extract Inhibiting the Metabolic Activation of Carcinogens in Vitro. *Nutr Cancer.* 1978; 1(3):19-21.
23. Chui-Nan L, Dabney B J, Shaw C R. Inhibition of In Vitro Metabolic Activation of Carcinogens by Wheat Sprout Extracts. *Nutr Cancer* 1978; 1(1): 27-30.
24. Chernomorsky S A, Segelman A B. Review Article: Biological Activities of Chlorophyll Derivatives. *NJ Med.* August 1988; 85(8): 669-673.
25. Devadas R P, Murthy N K. Biological. Utilization of Beta-Carotene from Amaranth and leaf Protein in Preschool Children. *World Rev Nutr Diet.* 1978; 31: 159-161.
26. Miller J M, Jackson D A, Collier C S. The Inhibition of Russell's Viper Venom by the Water-Soluble Derivatives of Sodium-Copper Chlorophyllin. *Am J Surg.* January 1960; 99: 48-49.
27. Rafskey H, Krieger A, Charles I. The Treatment of Intestinal Diseases with Solutions of Water-Soluble Chlorophyll. *Rev Gastroenterol* 1948; 15: 549-553.

Author Information

Mehan A. Pascuzzi, B.Sc.

Departments of Chemistry and Biochemistry, Mercyhurst College

Candee C. Chambers, Ph.D.

Departments of Chemistry and Biochemistry, Mercyhurst College