

Alternative Nutrition Therapy: Kombucha

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Introduction

Kombucha is a sweetened, fermented tea that includes a “Kombucha mushroom.” The Kombucha mushroom is not actually a fungus, but it is thought to resemble a mushroom, hence the name. The Kombucha mushroom is a symbiotic yeast and bacteria mixture. This drink is thought to have healing or preventative properties for many ailments. It has gained interest in the recent past, and has attracted followers as well as naysayers.

History

Kombucha is thought to originate from China around 221 BC, during the Qin Dynasty (Ancient Chinese secret?). It was believed that drinking it would enable consumers to live forever. It is thought that it spread to Germany and Russia next. Making Kombucha at home is easy and was the common practice for thousands of years. There are five steps to making Kombucha (How to make Kombucha). The first step is to boil water and brew black or green tea in a pot. Then, turn off the heat and add sugar. Vinegar is added next to create an acidic environment. The tea and vinegar mixture should be cooled down before adding Symbiotic Culture of Bacteria and Yeast (SCOBY) so the SCOBY will not be killed. The last step is to seal the jar and let it ferment for a week. Sanitizing all the equipment is recommended to avoid contamination.

Modern History and Uses

People may have been making Kombucha in the US long ago, but because it can be made in the home, there are no exact records of when it was introduced or who introduced it in the US. It likely traveled to America with immigrants from Europe. Through thousands of years, Kombucha has consistently sparked an interest in people for the same reason—it’s perceived health benefits.

Though the tea may have a longer history in the US there was a noticeable surge in interest surrounding Kombucha as of the mid-1980's, which can be attributed to a variety of reasons. In the 1980's HIV and AIDS was still a rather new diagnosis, and there hadn't yet been significant drug research or major findings about how to treat it. People who were diagnosed with HIV/AIDS were looking for any answer they could find to stay healthy and beat their mysterious diagnosis. Many people resorted to alternative therapies including the ancient practice of drinking Kombucha tea. Kombucha found a niche within this population.

At about the same time there was an increased interest in Kombucha tea among the elderly population, who believed that Kombucha tea had properties that could help to reverse the effects of aging. In the 1990's Kombucha was still fairly uncommon and unheard of in most circles, but some groups were drinking it as a type of beauty aid.

Another huge factor attributed to the rise of Kombucha tea in the last 15 or so years, is that since about 1995 Kombucha has been commercially made and sold in stores in the US. At first the companies started small and served the niche markets, distributing their tea to small health food stores. Eventually, with increased recognition of the product, the companies started supplying Kombucha to bigger stores such as Whole Foods Markets. The commercial brewing companies may have some people to thank for the increased recognition of their product. Many celebrities, such as Lindsay Lohan, have been photographed drinking the commercially made Kombucha, which in turn had a big impact in spreading the news about the product to the general population. Also Ronald Reagan reportedly started to drink the beverage when he was diagnosed with cancer in the 1980's. There are currently two versions of Kombucha on the market, which are a raw unpasteurized version that may have a small alcohol content, like the kind made in the home, as well as a pasteurized version that has no alcohol content. People who

drink Kombucha in today's environment may do so for more than one reason. Some people may be drinking it for its historical healing and disease prevention reputation, some may drink it because it is trendy and glamorized, and some may drink it for a different reason altogether.

Nutrition Facts

Since Kombucha is often made at home with different varieties of teas, sugars, bacteria, and yeasts, it is very difficult to determine the nutrition facts for homebrewed Kombucha teas. However, the commercial teas have a nutrition facts label on each bottle that can be referenced. One serving of the most popular commercially produced Kombucha product, G.T.'s Classic Raw Kombucha, contains 30 calories, 10mg sodium, 7g carbohydrates, and 2g sugars. Additional nutrients include vitamins B1, B2, B3, B6, B12, and folic acid; the probiotics *Lactobacillus Bacterium* and *S. Boulardii*; the antioxidant EGCG; and the organic acids glucuronic acid, lactic acid, and acetic acid. Different versions of Kombucha may have completely different ingredients or a different amount of nutrients.

Drug/Nutrient Interactions

The pH of Kombucha is around pH2.5-3 so it may affect the pH of the stomach (Sreeramulu, Zhu & Knol, 2000). It may change the ability of any medication that depends on the normal pH of the stomach. If Kombucha is consumed in a large amount, it may cause metabolic acidosis. Symptoms such as jaundice, hyperbilirubinemia and elevated serum liver enzyme were also reported with high consumption of the tea (Kombucha). Consumers may also experience increased caffeine level in the blood if excessive Kombucha is consumed. There are reported incidents that some people are allergic to the Kombucha tea. Lead poisoning was documented in a case in which a ceramic pot was used to brew the tea. There are a few case studies where consumption of contaminated Kombucha or excessive amounts of Kombucha were

the cause of death. Every case study that resulted in death was caused by home made Kombucha.

Effectiveness

No significant research has been done on humans relating to the validity of the health claims associated with drinking Kombucha, but there have been several studies done involving Kombucha tea and its constituents and the effect they have on rats, human pathogens, and human enzymes.

One of the claimed health benefits of Kombucha tea is that it has antimicrobial effects on human pathogens. Several studies were done in the late 1990's to determine if there was an antimicrobial effect associated with Kombucha. One study showed that the Kombucha did have antimicrobial properties and contributed it to the acetic acid content, which results from tea fermentation (Greenwalt, Ledford & Steinkraus 1998). A more recent study from the year 2000 had the goal of determining if the antimicrobial activity was only caused by the acetic acid component, or if there may be other factors involved. The 2000 study used acetic acid as a control and found that "Acetic acid was inhibitory toward all of the bacteria, but not the yeasts, while Kombucha did inhibit the growth of *Cn. Albicans*. Also, acetic acid showed the same inhibition as Kombucha toward 10 of the 14 bacteria. In the other four cases (*E. coli*, *Sal. enteritidis*, *Sal. typhimurium*, and *Sh. sonnei*), Kombucha had its strongest antimicrobial effects, and these were also exhibited at pH 7.0 and after heating" (Sreeramulu, Zhu & Knol, 2000). The study implied that these other antimicrobial compounds are likely metabolites produced by the bacteria and/or yeasts in the Kombucha mushroom, though it is not confirmed (Sreeramulu, Zhu & Knol, 2000).

Another health claim regarding Kombucha is that it has anti-oxidative properties, which

are thought to prevent cancer from forming or metastasizing and prevent the effects of aging. Epigallocatechin gallate (EGCG) is a type of anti-oxidant commonly found in teas, and is sometimes found in some types of Kombucha teas. Whether EGCG is present or not depends on the type of tea used to make the Kombucha. Green tea specifically is rich in EGCG. There has been some scientific research on the effect of EGCG. One study that looked at the protective activity of tea against infection found EGCG to be inhibitory for the growth of *S. aureus* and *V. cholerae* (Toda, Okubo, Ikigai, Suzuki & Shimamura, 1991). Another study looked into whether or not this anti-oxidant truly had an effect on the growth of cancer. The specific cancer studied was adenocarcinoma lung cancer. What typically happens in many types of human carcinoma's, including lung cancer, is that the fatty acid synthase (FASN) enzyme is hyperactive, which has made FASN a possible target for anti-cancer therapies. This study applied EGCG to the FASN enzyme in vitro and discovered that EGCG was effective in blocking FASN activity at 89.3% inhibition (Relat, Blancafort, Oliveras, Cufi, Haro, Marrero & Puig, 2012). The same study concluded that, "EGCG reduced the growth of adenocarcinoma human lung cancer xenografts (in rats) without inducing body weight loss. EGCG may be a candidate for future pre-clinical development." (Relat, Blancafort, Oliveras, Cufi, Haro, Marrero & Puig, 2012).

A study was done in rats to determine if Kombucha prevents kidney and liver damage from radiation and/or oxidation (Ibrahim). Cadmium chloride was used in rats in the experiment, which can be found in polluted air and food. Cadmium chloride can increase free radical production and cause oxidative degradation in mammals. Cadmium is accumulated in the kidney and liver and can cause metabolic damage. Gamma waves were used in radiation treatment. Antioxidant levels in rats were recorded.

Rats were divided in eight groups including a control group. Variations of treatments

(Cadmium Chloride, radiation therapy, or both) with Kombucha, or without Kombucha were administered to each group. One group was given Kombucha with no other treatment. Rats that were treated with CdCl₂, radiation and the group that received both treatments had a significantly increased alanine transaminases (ALT) and aspartate transaminases (AST). ALT and AST levels in blood were used to determine hepatic and nephritic toxicity. The number of AST and ALT increases when the body is under metabolic stress. The result shows that Kombucha lowers the elevation of ALT and AST. The antioxidant levels were higher in the groups that were given Kombucha. The study shows that consumption of Kombucha can decrease kidney and liver toxicity from oxidative stress by radiation and/or cadmium chloride.

Discussion

It should be noted that the scientific studies previously cited were not carried out on humans, but were done in vitro, meaning in culture dishes in laboratories, or on rats. Therefore one cannot be certain if the results would hold true if applied to the human body. However, since ALT and AST are also found in humans, this study suggests that similar results may be possible in humans. Also some of the studies investigate the effects of certain components in Kombucha that are not unique to Kombucha. For example, EGCG is commonly found in regular tea, and is not unique to Kombucha tea. Similarly, Vitamin C, which is an antioxidant that can be found in Kombucha, can also be found in many other sources. This means it is not necessary to drink Kombucha in order to consume EGCG and/or Vitamin C. It must also be considered if the amount of beneficial ingredients in Kombucha tea is in high enough concentration to have any real effect on the functioning of the human body. Also, the study that looked at the effects of Kombucha on oxidation and radiation did not single out which component in Kombucha caused the beneficial results, so it is unknown whether it was a combination of factors that

affected the results or just one single factor. Overall, clinical research on humans is needed to confirm the efficacy of Kombucha.

Conclusion

After researching and analyzing Kombucha tea, many possible health benefits have become apparent. However, there is not enough solid evidence to proclaim that these possible benefits are definite or even valuable to humans. Drinking Kombucha is acceptable and relatively safe for healthy individuals, as long as certain precautions are taken. Those who are immunosuppressed should avoid drinking Kombucha, especially of the homebrewed variety due to the possibility of contamination. It is highly advised that those interested in brewing or drinking Kombucha research the risks that may be associated with the tea.

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