

Probable Gastrointestinal Toxicity of Kombucha Tea

Is This Beverage Healthy or Harmful?

Radhika Srinivasan, MD, Susan Smolinske, PharmD, David Greenbaum, MD

Kombucha tea is a health beverage made by incubating the Kombucha “mushroom” in tea and sugar. Although therapeutic benefits have been attributed to the drink, neither its beneficial effects nor adverse side effects have been reported widely in the scientific literature. Side effects probably related to consumption of Kombucha tea are reported in four patients. Two presented with symptoms of allergic reaction, the third with jaundice, and the fourth with nausea, vomiting, and head and neck pain. In all four, use of Kombucha tea in proximity to onset of symptoms and symptom resolution on cessation of tea drinking suggest a probable etiologic association.

KEY WORDS: alternative therapies; gastrointestinal toxicity; Kombucha tea; allergic reactions.

J GEN INTERN MED 1997;12:643–644.

Use of Kombucha (synonyms: Manchurian or Kargasok) “mushroom” steeped in tea and sugar to create a tonic for various purported therapeutic benefits is popular in America. Kombucha is not a fungus but a symbiotic yeast-and-bacteria aggregate surrounded by a permeable membrane. It is said to cure cancer, decrease blood pressure, increase vitality, increase T cell counts, fight acne, relieve arthritis pain, eliminate wrinkles, cleanse the gall bladder, alleviate constipation, and even restore gray hair to its original color.¹

Lay literature alludes to the “Kombucha retch factor” after ingesting more than 4 oz a day. There are few scientific reports of side effects. Herein, we discuss possible complications related to use of Kombucha tea in four patients.

CASE REPORTS

Patient 1

A 55-year-old woman with an 8-year history of heavy alcohol consumption presented with jaundice of 6 weeks’

duration. She started drinking two glasses of Kombucha tea a day 2 months earlier. At the onset of jaundice she stopped drinking the tea and reduced her alcohol intake. She was taking glyburide. Physical examination revealed icterus with no stigmata of chronic liver disease. Pertinent liver test results were: aspartate aminotransferase (AST), 259 U/L; alanine aminotransferase (ALT), 585 U/L; alkaline phosphatase, 203 U/L; total bilirubin 5.3 mg/dL; γ -glutamyl-transferase, 781 U/L; cholesterol, 517 mg/dL; serum albumin, 4.4 g/dL; and prothrombin time, 12.6 seconds. Serology for viral hepatitis A, B, and C was negative, as were evaluations for iron and copper overload, autoimmune hepatitis, and primary biliary cirrhosis. She had a normal platelet count and computed axial tomography scan of the abdomen was normal. Seven weeks later all abnormal laboratory values normalized. Patients with alcoholic liver disease have AST values less than 300 U/L and trivial elevations of ALT levels, resulting in the increased AST/ALT ratio characteristic of this disease.²

Patient 2

A 51-year-old woman complained of xerostomia, dizziness, nausea, vomiting, headache, and neck pain. She had consumed a half-glass per day of Manchurian tea for several months. The patient was taking thyroid hormone and estrogen replacements. She was treated symptomatically for 2 days and released. On reingestion of tea, symptoms recurred and she was readmitted. Her hospital course was complicated by three syncopal episodes in addition to earlier noted symptoms. The only significant laboratory value was a caffeine level of 3.8 mg/L, 48 hours after admission. The “mushroom” was analyzed by gas chromatography/mass spectrometry and found to contain only caffeine (Fig. 1).

Patients 3 and 4

Patient 3 presented with shaking, shortness of breath, and akathisia after consumption of tea and no other medications; patient 4, with shortness of breath and throat tightness after consumption of tea an hour before and ephedrine 5 minutes before. Examination revealed hypotension, tachycardia, and tachypnea in both patients and hypothermia in one of them. All routine laboratory data were normal in both patients except for an elevated white blood cell count in patient 3. Both were treated for a presumed allergic reaction and discharged the same day.

Received from Texas Tech Health Sciences Center and Veterans Affairs, Amarillo (RS); Children’s Hospital of Michigan Poison Control Center, Detroit (SS); and Michigan State University, East Lansing (DG).

Address correspondence and reprint requests to Dr. Srinivasan: Department of Medicine, Division of Gastroenterology, Texas Tech Health Sciences Center, 1400 Wallace Blvd., Amarillo, TX 79106-1797.

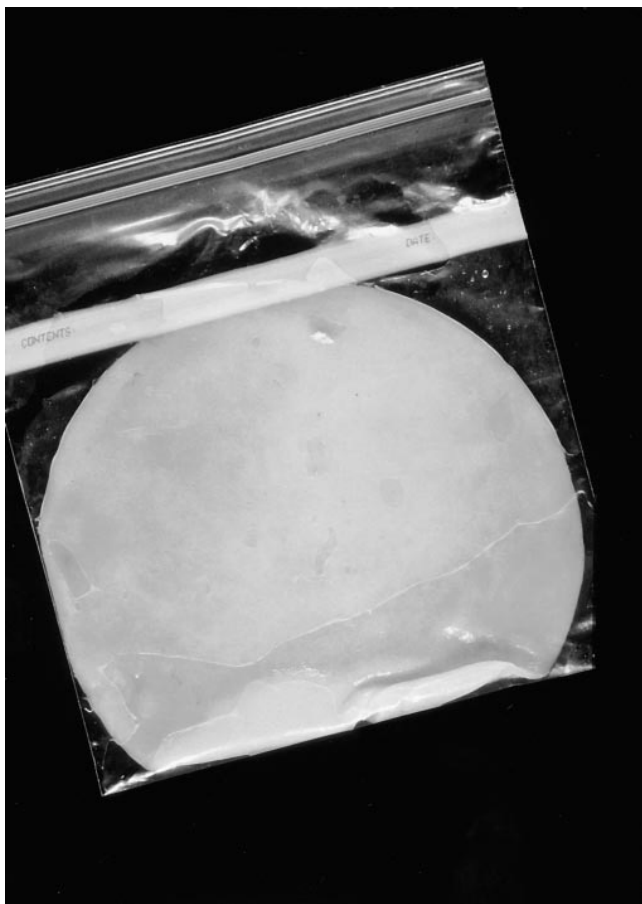


FIGURE 1. The Kombucha mushroom obtained from patient 2 (5 × 7 inches).

DISCUSSION

In all four patients, use of Kombucha tea in proximity to onset of symptoms and symptom resolution on cessation of tea drinking suggest a probable etiologic association. Patient 2 reingested the tea and symptoms recurred. Rechallenge in the others was felt to be unethical. All four patients had obtained the original cultures from friends. Patient 1 was consuming the tea to decrease her craving for alcohol, patient 3 to treat her multiple sclerosis, and the other two had no particular reason.

Literature searches of MEDLINE, POISINDEX, NAPRALERT (Natural Products Alert), and AMED (Allied and Alternative Medicine) yielded only three reports of possible toxicity related to Kombucha tea consumption in humans³⁻⁵: (1) a male had truncal rash, hepatomegaly, and abnormal liver chemistry values following 1 month's ingestion of Kombucha tea. Following cessation of tea consumption, symptoms and laboratory values improved. (2) Two women, both with unexplained severe metabolic acidosis, gave a history of consumption of Kombucha tea. One died while the other recovered. Another 115 persons used "mushrooms" derived from the same source without untoward effects. (3) Elevation of AST/ALT (>2,000 IU/L) and

lactate dehydrogenase level (>4,000 IU/L) occurred in an 83-year-old after drinking Kombucha tea daily for 3 weeks.

To assess the prevalence of Kombucha tea drinking in a town, a 1% sample of households ($n = 119$) were contacted by telephone using random digit dialing. Seventy percent of the respondents were women (mean age 51.2 years), 3.8% of whom reported that at least one household member had tried the tea. Of these, two had regularly consumed it but stopped after 2 weeks because of taste and symptoms thought to be related to the tea.³

Analyses of Kombucha mushroom demonstrate a large number of bacteria, including *Acetobacter ketogenum* and *Pichia fermentans*. When Kombucha is fermented in tea, 0.5% alcohol, glucuronic acid, hyaluronic acid, chondroitin sulfate, heparin, and lactic acid are produced.⁶ The FDA, surveying commercial producers, has found no pathogenic bacteria or hygiene violations.⁷ It is possible that the home-brewed version becomes contaminated by other more pathogenic bacteria or yeast. A survey of home-cultivated Kombucha revealed massive contamination with *Penicillium spp.* in one case and *Candida albicans* in two.⁸ When the tea is prepared as directed, the pH becomes 1.8 in 24 hours, which should prevent survival of most organisms. Because of its acidity, the tea should not be prepared or stored in ceramic or lead crystal containers, as toxic elements can leach into the tea. Drinking 4 oz of this "mushroom" tea may not cause adverse effects in normal persons. Potential health risks are unknown for those who have preexisting health problems or drink excessive amounts.

In conclusion, these four cases highlight the use of a specific alternative therapy with potential for toxicity. We have no evidence for the mechanism of side effects, or whether they are related to the Kombucha or to a contaminant. Health care providers need to ask questions about the use of alternative therapies, particularly when patients present with perplexing complaints.

REFERENCES

1. Hauser SP. Dr. Sklenar's Kombucha mushroom infusion: a biological cancer therapy. *Schweitz Rundsch Med Parx.* 1990;79:243-6.
2. Carithers RL. Alcoholic hepatitis and cirrhosis. In: Kaplowitz N, ed. *Liver and Biliary Diseases.* Baltimore, Md: Williams and Wilkins; 1992:334-46.
3. Perron AD, Patterson JA, Yanofsky NN. Kombucha "mushroom" hepatotoxicity. *Ann Emerg Med.* 1995;26:660-1. Letter.
4. Currier RW, Goddard J, Buechler K, et al. Unexplained severe illness possibly associated with consumption of Kombucha tea—Iowa 1995. *MMWR.* 1995;44:892-900.
5. AAPCC. Alert: "Kombucha Tea" and Hepatotoxicity. Washington, DC: American Association of Poison Control Centers; November 8, 1993.
6. Staments P. My adventures with the Blob. Mushroom—*The Journal.* Winter 1994:5-9.
7. Food and Drug Administration. FDA Cautions Consumers on "Kombucha Mushroom Tea" (News Release). Washington, DC: U.S. Department of Health and Human Services, Public Health Service, Food and Drug Administration; March 23, 1995.
8. Mayser P, Fromme S, Leitzmann C, Grunder K. The yeast spectrum of the "tea fungus Kombucha." *Mycoses.* 1995;38:289-95.

REFLECTIONS

His Heart

I could hear the beating coming from the narrow closet of my bedroom. It was as if the noise was connected to the dawn itself. As soon as darkness fell and I tried to rest, the thudding began. I buried my head in the soft down of my pillow but the pounding only grew louder. When I could ignore it no longer, I rose from my bed and opened the closet door. I saw my eyes widen and then realized that I was standing outside myself, watching.

I sat up last night after the dream, knowing I had seen my father's heart. I wondered if he was trying to communicate with me. I had held a white plastic bucket near his bed to capture the pungent liquid that he threw up, his head turned to the side, his face almost in the bucket. I wiped the strands of phlegm from the corners of his mouth and his lips so the taste of digested food would not stay with him. His extremities had become fragile, the flesh sagging over the long bones so I could almost see his radius. I remembered those arms when they were bulging with muscle and sinew, the veins underneath the skin threatening to burst through.

After his baths, I would wrap my thick blue towel around his waist, twisting the towel over itself so it would remain in place. He would rest one arm on my shoulder, leaning slightly into me while my arm held his waist and we would move slowly toward the bedroom. He sat on the bed, catching his breath while I tried to dress him.

When he coughed I heard the dry hacking sound, like dust in his lungs. His wasting body shook with each cough and I sat with my arm on his shoulder, trying to hold him up so that he would not choke. I placed my hands on the back of his shoulders, wary of irritating any sores that may have formed on his back. The entire room smelled like his illness. It reminded me of old clothes that had been packed away with moth balls, the dampness of the air in the bag penetrating the fibers. No matter how hard I tried I could not wash the scent away.

I picked up a large plastic comb and rested it in his scalp, moving the teeth slowly through tight springy curls. I could tell by the parting of his lips that he was relaxed. Many times a tightening around the mouth and his clenched jaws were the only signs that betrayed him. I imagined I looked like that when I refused to cry, when I bit down on the emotion that threatened to come barreling through my chest. He would not allow his lips even to quiver. I asked him if he needed anything and he said no. He said it so gallantly, never flinching or complaining, that I admired him.

This routine would end with him lying on his back wearing loose pants and a long-sleeved shirt. He would close his eyes or look up at the ceiling, tired. Last week, he was different. He took my hand and placed it on his chest and I could feel his heart pounding.

I called his doctor soon after that. He looked at my father on the bed, then at me. I could not read his expression. I only noticed that his laugh lines had become deeply etched wrinkles and his hair had turned a silvery white. He did not have to say anything and he did not try to speak to me. Death had long ago invaded the room. He simply rested his arm on my shoulder. He seemed to know that I did not call him for my father but for myself. I was tired of the silence that had overtaken my house. I needed the company of another human being who would speak to me, who would not be frightened by the sight of the man on the bed.

SHARON MALCOLM
*Brown University Medical School
Providence, RI*