

## A Recipe for 'Medoroga'

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*WRITER'S COMMENT: When I first came to the United States of America two years back, I found myself surrounded by talk of meditation and soothing herbal infusions as a healthy form of rejuvenation. Then it struck me: I was brought up this way, with my grandfather meditating before he slept and my mother making hot teas with honey and basil when I got a cough. Banal Indian words like 'yoga' and 'Ayurveda' were alien in their exoticness. The further I thought about this "new" lifestyle that had crept into the American society, the more I realized how much I, the Indian city girl, had squirmed away from it.*

*The focus of my assignment was to remind myself of my roots. As a Microbiology student who has consciously only learned western medicine, proofs, and facts, I wanted to reach into the alternate aspect of my life that has unknowingly lent itself to teaching me simple ways to be healthy and happy. A life that is so strongly integrated into my being that I sometimes forget to acknowledge it and endow to it the respect it deserves. In this article, I attempt to explain the basic philosophy of Ayurveda, which is slowly being proved by scientists today. As the world is moving towards alternative therapies for diseases like obesity (Sanskrit: Medoroga), Ayurveda offers a holistic cure and, hopefully, its recipes for a healthy life will one day be recognized as formal medicine.*

*INSTRUCTOR'S COMMENT: Students in my UWP 104E class are sometimes frustrated when we shift our focus from technical to more popular science writing and communication styles. Many are challenged by the Popular Article assignment that asks them to present technical research or a topic that interests them for a general audience. When Shikha visited my office with an early draft of her article about obesity, I was impressed by her insights about the connections between western medical science and the ancient philosophy and practice of Ayurveda. Her brief description of her mother's daily process of making chutney became the focal point of Shikha's article, and I believe her success in bringing a bit of her personal history into a discussion of her*

*academic study of microbials and their effect on digestive health are indicative of the sharp mind that will bring her many future successes.*

—Katie Rodger, University Writing Program

Let me introduce you to an unbelievably spicy and sweet tomato *chutney* my mother makes on most days of the week to accompany our daily meal of *chapatis* (wheat *naans*), vegetable curry, and steamed rice. This luscious *chutney* is a granular paste of ginger, garlic, chilly powder, vinegar, sugar, turmeric, fresh tomatoes, and onions, with all ingredients perfectly blended together in an invigorating garnish that stimulates each taste bud by simply including ‘all’ tastes: sweet, sour, salty, bitter, pungent, and astringent.

My mother makes this *chutney* in the early hours of dawn, carefully peeling fresh ginger and garlic cloves. She grinds them together into a coarse, bitter infusion, which is added to a kettle with finely diced onions and tomatoes. While this heterogeneous mixture simmers on moderate heat, she adds each spice in the most painstaking and punctilious manner. The *chutney* tastes perfect and the whole family devours it with the food, sitting together, around the round dining table with the bowl lying invitingly in the center.

To create this complex and time consuming, albeit delicious preparation, conscious and precise detail towards the ingredients is needed and every taste must be meticulously added. The reason for this exhaustive concoction lies in the ancient philosophy of meal preparation in India belonging to *Ayurveda*, which literally means life-knowledge. It follows the belief that any ailment affecting a human body should be treated initially with foods based on six tastes, where each taste has a specific therapeutic action (Gupta, 2013). This philosophy emphasizes that the advent of a disease is the result of disproportional consumption of one or more tastes, which makes the diet unwholesome and harms the body constitution. Thus, if I prepared an entire meal without including a particular ‘taste,’ I would be left unsatisfied, imbalanced, and unnaturally craving for more.

The universal craving for the pleasurable experience of saccharine abundant food, the ‘sweet taste,’ causes *medoroga*. Charak, the principal contributor to the art and science of *Ayurveda*, first documented this disease in 1500 B.C. (Vaidya, 2013). He described in considerable detail a *medorogi* (a person suffering from the disease) as an individual

whose increased adipose and muscle tissue makes his hips, abdomen, and muscles pendulous, whose vitality is much less than his body size, and whose fat tissue is diseased (Vaidya, 2013). 5000 years later, western scientists named this disease that causes fat accumulation—obesity.

Today, *medoroga* is an increasingly widespread medical condition. It has spread rapidly, afflicting one-third of the adult American population with associated medical costs estimated at \$147 billion per year (Centers for Disease Control and Prevention, 2012). It is a public health crisis posing a menacing risk factor in diet-related chronic diseases like diabetes, hypertension, heart disease, and kidney failure, which account for some of the current leading causes of preventable death.

An imminent urgency to control obesity makes it a significant topic of interest amongst scientists attempting to determine the cause of its current prevalence. Recent research links the cause of obesity to the shift in the representation of the dominant species of bacteria in the gut of both human and animal models (Andreeva, 2012). After decades of experimental studies, the genesis of this disease has been ascribed to the internal imbalance in the microbial 'organ' of the human body. This imbalance is caused by the changes of lifestyle and diet from physical labor and plant foods to sedentary forms of activity and fat filled nutrition.

However, Western scientists have only recently (around 200 years back) begun to believe the germ theory of diseases, which was recorded in the *Vedas* and brought to light by the *Vedic Sages* centuries ago (Rishi Kanva Vedic Microbiology Research Institute, 2013). This classical theory refers to diseases caused by microorganisms: organisms too small to be seen without magnification, which invade the host and trigger a pathophysiology in the human body (Science Museum, 2013a). Robert Koch, a well-known German scientist, provided the scientific proof of this theory by growing microbes on a petri dish and opened the door to the research of thousands of bacteria and their effect on the environment and the human body (Science Museum, 2013b).

Using the latest sophisticated tools of molecular and computational gene sequencing, investigators have estimated that the gastrointestinal tract in adult humans contains approximately  $10^{12}$  microorganisms composed of at least 500 to 1000 distinct species per millimeter of luminal content (cavity of intestine) (DiBaise et al., 2008). At birth, the gut of an infant is sterile, but over a period of several months, microbes begin to assemble in the body, and, by the age of four, this micro-biome

becomes fully mature (Sekirov, Russell, Antunes, & Finlay, 2013). The evolving micro-biome is primarily influenced by the individual's growth environment, which generates a unique microbial composition that stabilizes in the healthy adult (Sekirov et al., 2013).

This complex microbial ecosystem is intimately linked to the development, physiology, and health of the host, making it susceptible to both exogenous and endogenous modifications like food diet, surgical operations, and antibiotics (Sekirov et al., 2013; Bervoets et al., 2013). Balancing the key species of this community is imperative since their metabolic activities affect specific host responses and regulate homeostasis, a process that keeps the body's internal environment stable. For example, a widely distributed bacterial species that colonizes the gut, *Bacteroidetes*, contains genes that encode for crucial enzymes, which increase the host's capacity to obtain energy from food by digesting complex sugars and proteins into simpler, digestible food (Wolf & Lorenz, 2012).

Interestingly, *Ayurveda* recognized a long time ago that no two individuals are the same and developed the concept of body constitution. This ancient medicine deems the body constitution to be determined by the proportion of three *doshas*, or body humors, called *Pitta*, *Kalpha*, and *Vata*, which are present in all individuals—we are born with this constitution and it cannot be changed (Whispering Worlds, 2008). *Pitta* is the energy that controls the body's metabolic systems, including digestion and absorption. *Kalpha* is the energy that controls the growth and water supply of the body, and *Vata* is the energy that controls bodily functions associated with motion and blood circulation. *Ayurveda* asserts that the knowledge of one's body constitution can prove to be extremely beneficial since it allows for the systematic planning of a potent diet, tailored specifically for the individual (Whispering Worlds, 2008).

What strikes me as incredibly impressive about this idea is that 5000 years after its inception, it has been proved scientifically veritable. Current research has discovered that every human has an individual and distinct bacterial makeup, which can be assigned to one of the three enterotypes (classification of living organisms based on its predominant bacteriological ecosystem in the gut micro biome): Bacteroidetes, Prevotella, or Ruminococcus. These bacterial enterotypes are conserved globally: independent of race or gender (Willingham, 2011). Each bacterial enterotype has a different food preference and a different physiological output profile. Thus, the bacterial enterotype strongly

influences the digestion, absorption, and circulation of food in the body: processes that depend on the bacterial ecosystem housed by the individual (Willingham, 2011). In fact, scientists have now concluded the same philosophy of the *Ayurveda*: what you are is what you host (Whispering Worlds, 2008).

Through two separate experiments, scientists have recently demonstrated that alteration of the internal gut microbial composition, that is, the alteration of the body constitution is the cause and not a consequence of obesity. In one experiment, bacteria from the gut of obese mice when inoculated into the gut of germ free mice (mice grown in sterile conditions, hence lacking bacterial colonization) showed 60% increased body fat of the latter within two weeks without extra food intake, proving that specific bacteria in the gut lead to obesity (DiBaise et al., 2008; Aronsson et al., 2010). The other experiment involved transplantation of bacteria from the gut of obese mice into the gut of lean mice, leading to an increase in fat content of the latter, confirming the relationship between gut micro biota and obesity (Wolf & Lorenz, 2012).

Models of diet-induced obesity, which investigate the relationship between diet, obesity, and gut micro biota, have found that high fat, high sugar western diets when compared with low fat, high polysaccharide diets, change the relative abundance of certain bacteria in the gut (Wolf & Lorenz, 2012; DiBaise et al., 2008; Aronsson et al., 2010; Musso, Gambino, & Cassader, 2010). The Western diet, fed to mice models, induced enrichment in genes that enable increased energy harvest by bacteria from food. These genes affect lipid metabolism, directly impacting the emulsification (breakdown of fat globules) and absorption properties of bile acids and indirectly impacting liver fat storage and lipid per-oxidation (oxidative degradation of lipids) (Musso et al., 2010). Importantly, the same experiments also illustrated a reversal in the functional properties of these genes from high energy intake to reduced energy intake, caused by a shift in micro biota, when the diet was reverted to the original, fat free nutrition (Musso et al., 2010). This microbe rearrangement affirmed that the microbial composition of the gut conforms to the host's diet as it attempts to break down the ingested compounds to regulate the body's energy metabolism. Furthermore, data from human studies were found consistent with data from mouse models when obese human subjects, placed on a diet of carbohydrate restricted or fat restricted diet for a year, displayed increased proportions of *Bacteroidetes* in their gut (Musso et al.,

2010). Altogether, these experimental studies provided evidence of long-term diet affecting the individual's enterotype state (Wu et al., 2011). Similarly, Ayurveda practitioners also assert that different diets can affect the balance of one's *doshas*, leading to disease and disharmony (Ayurveda Today, 2013).

After having established the relationship between diet, obesity, host-body constitution, and intestinal micro-biota, researchers have been focusing on the development of non-invasive solutions of weight loss. They are investigating probiotics and prebiotics as alternatives to invasive and risky approaches like bariatric surgery. Probiotics is the use of live bacteria that can benefit the health of the host. The largest group of probiotic bacteria in the intestine is lactic acid bacteria, which is also found in foods consumed daily like yogurt and milk. Another example of gut bacterial augmentation is yeast, which is consumed in the form of breads and beer (WebMD, 2013). While probiotics are salubrious bacteria, prebiotics are food ingredients that stimulate the growth of certain favorable microbial species in the gut. They act as "fertilizers" in the growth of beneficial commensal organisms (Krzniarić, Vranešić, Kunović, Kekez, & Štimac, 2012). They are soluble fiber, like insulin and oligo-fructose, which the gut bacterial flora can consume and ferment. They reduce the glycemic response, energy intake, and food intake by modulating the endocrine function in the gut (Krzniarić et al., 2012). Thus, based on this new information of diet regulated obesity and weight loss, nutritionists design comprehensive diets or prescribe supplementary diet pills for individuals to control weight gain.

This diagnosis and treatment approach follows the same principle *Ayurveda* is based upon, except it is a small fraction of what *Ayurveda* considers as creating a truly healthy individual. So what is *Ayurveda* if not just a custom fit diet and how is it different from modern medicine? *Ayurveda* is my mother's sublime recipe of the tomato *chutney*, along with her meticulous disposition that actualizes it. It is the combination of food and lifestyle routines, which focuses on maintaining a physically and emotionally balanced state. It is the comprehensive science of health, which began when Indian monks were looking for new ways to be healthy. Revering their bodies like godly temples, the monks believed that preserving their health would help them meditate and develop spiritually (Andreeva, 2012). Over thousands of years of observations, they gathered their conclusions and advice and preserved them for future

generations. The collection of knowledge came to be known as the 'science or knowledge of life—*Ayurveda*' (Andreeva, 2012).

At this junction in medical science when the world is looking for alternative forms of medical cures, *Ayurveda* is beginning to gain recognition and respect. Maybe one day, thousands of years of its medical knowledge will be studied, analyzed, proved, and accepted as formal medicine. Until then, it will continue creeping into the lives of millions of people over the world, unknowingly, in their mid afternoon hot herbal infusions or early morning body stretches. Its subtle, eternal cures for diseases like *medoroga* will continue to materialize themselves in the holistic recipes of unrelenting disciplined routines, gratifyingly tasty seasonal fresh fruit plates, and peacefully relaxing family dinners.

## References

- Andreeva, N. (2012). Ayurveda and Dosha types for Beginners. *MindBodyGreen*. Retrieved from <http://www.mindbodygreen.com/0-1117/Ayurveda-Dosha-Types-for-Beginners.html>
- Aronsson, L., Huang, Y., Parini, P., Korach-André, M., Håkansson, J., Gustafsson, J.Å., Pettersson, S., Arulampalam, V., Rafter J. (2010). Decreased fat storage by *Lactobacillus paracasei* is associated with increased levels of angiopoietin-like 4 protein (ANGPTL4). *PLoS One*, 5(9). pii: e13087. doi: 10.1371/journal.pone.0013087.
- Ayurveda Today. (2013). What's my Dosha? *Ayurveda Today*. Retrieved from <http://www.ayurvedatoday.co.uk/pages/the-doshas.php>.
- Bervoets, L., Van Hoorenbeek, K., Kortleven, I., Van Noten, C., Hens, N., Vael, C., Goossens, H., Desager, K.N., Vankerckhoven, V. (2013). Differences in gut microbiota composition between obese and lean children: a cross-sectional study. *Gut Pathog.*, 5(1): 10.
- Centers for Disease Control and Prevention. (2012). Obesity. *Centers for Disease Control and Prevention*. Retrieved from <http://www.cdc.gov/obesity/data/adult.html>
- DiBaise, J.K., Zhang, H., Crowell, M.D., Krajmalnik-Brown, R., Decker, G.A., Rittmann, B.E. (2008). Gut microbiota and its possible relationship with obesity. *Mayo Clin Proc.*, 83(4): 460-9. doi: 10.4065/83.4.460.

- Gupta, S. (2013). Ayurveda . . . The philosophy of Indian Cuisine. Retrieved from <http://sandeepgupta.com/pages/Ayurveda.html>
- Krznarić, Ž., Vranešić, Bender D., Kunović, A., Kekez, D., Štimac, D. (2012). Gut microbiota and obesity. *Digestive diseases*, 30(2): 196-200.
- Musso, G., Gambino, R., Cassader, M. (2010) Obesity, diabetes, and gut microbiota: the hygiene hypothesis expanded? *Diabetes Care*, 33(10): 2277-84. doi: 10.2337/dc10-0556.
- Rishi Kanva Vedic Microbiology Research Institute. (2013). Vedicmicrobiology. *Rishi Kanva Vedic Microbiology Research Institute*. Retrieved from <http://eai.eu/organization/rishi-kanva-vedic-microbiology-research-institute>
- Science Museum. (2013). Germ Theory. *Science Museum*. Retrieved from <http://www.sciencemuseum.org.uk/broughttolife/techniques/germtheory.aspx>
- Science Museum. (2013). Robert Koch. *Science Museum*. Retrieved from <http://www.sciencemuseum.org.uk/broughttolife/people/robertkoch.aspx>
- Sekirov, I., Russell, S.L., Antunes, L.C., Finlay, B.B. (2010). Gut microbiota in health and disease. *Physiol Rev.*, 90(3): 859-904. doi: 10.1152/physrev.00045.2009
- Vaidya, R. (2013). Maharashi Charak Ayurveda. Retrieved from <http://www.charakayurveda.com/>
- WebMD. (2013). *Digestive Disorders Health Centre*. WebMD. Retrieved from <http://www.webmd.com/digestive-disorders/features/probiotics-benefits>
- Whispering Worlds. (2008). Doshā Body Types. *WhisperingWorlds*. Retrieved from [http://whisperingworlds.com/ayurveda/dosha\\_body\\_types.php](http://whisperingworlds.com/ayurveda/dosha_body_types.php)
- Willingham, E. (2011). Which of the three gut types are you? *Human World*. Retrieved from <http://earthsky.org/human-world/which-of-the-three-gut-types-are-you>.
- Wolf, K.J., Lorenz, R.G., (2012). Gut Microbiota and Obesity. *Current obesity reports*, 1(1): 1-8.



Wu, G.D., Chen, J., Hoffmann, C., Bittinger, K., Chen, Y.Y., Keilbaugh, S.A., Bewtra, M., Knights, D., Walters, W.A., Knight, R., Sinha, R., Gilroy, E., Gupta, K., Baldassano, R., Nessel, L., Li, H., Bushman, F.D., Lewis, J.D. (2011). Linking long-term dietary patterns with gut microbial enterotypes. *Science*, 334(6052): 105-108.