Overview of Beverages with Anti-Aging Functions in Chinese Market

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Abstract

Anti-aging Chinese medicines have been used in traditional beverages to promote health and prevent diseases. Interestingly, these functional beverages may be used differently between men and women, reflecting the “yin-yang” philosophy of Chinese medicine. Modern studies have revealed that some dietary natural products can slow aging in model organisms, and functional beverages containing such products have recently emerged in Chinese market, challenging the dominance of traditional functional beverages. Here we summarize both traditional anti-aging herbs and modern natural dietary compounds currently used in functional beverages in China, and also briefly outline the underlying mechanisms of the beverages in slowing aging process.

Introduction

ALTHOUGH AGING IS AN IRREVERSIBLE PROCESS, anti-aging has been a dream for all cultures and all peoples at all times. For example, a number of traditional Chinese medicines have been used for centuries in anti-aging medications aiming to slow or reverse the aging process. Some of these medicines are shown to extend life span or alleviate age-associated diseases in animal models including mice and *Caenorhabditis elegans*.^{1,2} In practice, Chinese medicines are often extracted with water and used as a mixture, with decoction as the most common dosage form. As a result, edible anti-aging Chinese medicines are also traditionally used in functional beverages on the basis of their long and safe usage.³ These functional beverages have played an important part in the daily health care of Chinese people for thousands of years. With the development of preparation techniques, traditional functional beverages taste better and have become increasingly popular among more consumers. In recent years, however, foreign anti-aging functional drinks have emerged in the Chinese market. These modern beverages very often contain at least one of the well-known anti-aging natural compounds, such as resveratrol, carotenoids, epigallocatechin gallate (EGCG), and anthocyanins, which are known to have anti-oxidant,

anti-carcinogenic, and anti-inflammatory properties. Here we briefly summarize the principal components of both traditional and modern anti-aging functional beverages in Chinese markets. We also outline the underlying mechanisms of both types of beverages in slowing the aging process, such as their effects on free radicals and other stress resistance.

Traditional Anti-Aging Functional Beverages

Drinking functional beverages is a major way for daily energy and nutrition intakes between meals. There is a long history of drinking functional beverages in China, and very often the drinks are prepared with the advice of or directly by local doctors using traditional medicines. These beverages often contain a high concentration of “special nutrition” pivotal for patients or old people. After thousands of years of trials, a number of anti-aging medicines have been found to be beneficial to the body and can be used as the source of “special nutrition” in beverages, including well-known Chinese medicines such as *Panax ginseng*, *Astragalus membranaceus*, *Epimedium brevicornum*, *Lycium barbarum*, and *Colla corii asini*.

A large number of anti-aging functional beverages are used to improve declining sexual capacity, which is thought

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to be a main sign of aging. Interestingly, traditional anti-aging functional beverages for men and women are not always the same. The traditional beverages specifically targeting males always have an anti-fatigue effect or are aimed to slow down erectile dysfunction. The beverages targeting females are, on the other hand, often related to regulation of endocrine systems (*e.g.*, menstruation) with the aim to keeping healthy as well as young looking. This discrimination is in line with the philosophy of traditional Chinese medicine such as the yin-yang theory. Accordingly, the formulae for men and women may be different. For example, *E. brevicornum* and *Morindae officinalis* are frequently used for men, *Angelica sinensis* and *C. corii asini* are common in complex prescriptions for women, whereas *P. ginseng*, *A. membranaceus*, and *L. barbarum* are used for both men and women (Fig. 1A). These principles are followed in medical practice as well as in beverages and other health care products.

A growing number of recent studies support the traditional uses of Chinese herbs as functional beverages. For example, our recent work demonstrates that astragalan, a hot water-soluble polysaccharide from *A. membranaceus* roots, is not only able to extend the life span of both wild-type and transgenic polyglutamine (polyQ) *C. elegans* but also able to delay the age-associated increase of polyQ aggregation and neurotoxicity.⁴ The polysaccharides from *L. barbarum* are also shown to have a variety of beneficial functions, including anti-aging, anti-fatigue, anti-oxidant, neuroprotective, and immunomodulatory effects.^{5,6} Likewise, the aqueous extracts of *P. ginseng* roots are shown to increase the activities of superoxide dismutase, catalase, and glutathione peroxidase in aged rats and also reduce the occurrence of age-related disorders associated with free radicals.⁷ Similarly, hot water extracts of *E. brevicornum*, a medicinal herb known to boost sexual performance and used to treat sexual dysfunction, have been proved to have anti-oxidant and anti-aging effects.⁸ Another example is *C. corii asini* (E-Jiao in Chinese), a widely used anti-anemic remedy in traditional Chinese medicine. It is a gelatin

obtained from donkey skin by stewing with water and used for a range of ailments, including bleeding, dizziness, and insomnia. A recent report has revealed its effect on suppressing the aging process through enhancing anti-oxidant activity in D-galactose-induced aging in mice.⁹ These modern studies have not only provided experimental evidence for medical practice but at the same time have also increased the confidence of consumers of traditional functional beverages.

Modern Anti-Aging Beverages

Modern health care functional products have become commercially available worldwide in the last few decades, with anti-aging functional drinks as an important part of the health care commodities thanks to anti-aging studies of natural products in model animals.¹⁰ In this regard, resveratrol is probably the most widely known natural product. It is obtained from a number of plants, most famously from the skin of red grapes and the roots of *Polygonum cuspidatum*. Earlier studies suggest that resveratrol is capable of significantly extending the life span of model organisms, including the yeast *Saccharomyces cerevisiae*, the nematode *C. elegans*, and the fruit fly *Drosophila melanogaster*.^{11,12} Although inconsistent life span extension results, particularly in rodent models under normal conditions, were later reported, resveratrol has been shown to have the capability of counteracting detrimental effects of age-related deterioration and may be beneficial to the cardiovascular system, including anti-inflammatory and blood sugar-lowering effects.¹³ Because the grape is one of the best known sources of resveratrol and also a very popular fruit itself, grape juice or grapestone extract is added to a variety of beverages. Red wine has increasingly become a popular functional drink in China.

Tea polyphenols (*e.g.*, EGCG) are also reported to have a broad spectrum of biological activities, including anti-oxidant, anti-aging, anti-inflammatory, anti-diabetic, and anti-stress properties,^{14,15} and thus are popular additives in

FIG. 1. Anti-aging functional beverages sold online in China. (A) Traditional functional beverages. The ratio of products aimed at men and women were similar although the formulae were quite different. (B) Modern functional beverages. The number of products aimed at women was 10 times more than that aimed at men, but the formulae were quite similar. Data were from top three online stores in China (August, 2013). (Dashed ellipse) products aimed at men; (solid ellipse) products aimed at women; (square) for both men and women. EGCG, epigallocatechin gallate.

functional drinks, also due to the tea-drinking tradition in China. The phytochromes carotenoids and anthocyanins from a range of plant sources are also frequently found in functional beverages, and their biological functions are extensively studied as well. For example, the carotenoids from algae can protect cultured cells from oxidative stress by quenching singlet oxygen,¹⁶ whereas blueberry anthocyanins can prevent retinal pigment epithelial cells from aging and enhance the memory of aged rats.^{17,18}

From investigation on the anti-aging beverage products in the top three online stores in China, we find that the numbers of traditional beverages for men and women are almost the same (Fig. 1A), but modern beverage products are aimed ten times more at women than at men (Fig. 1B). This can be partly explained by the anti-oxidant properties claimed by modern anti-aging products: It is quite appealing to women that these anti-oxidant products have outstanding capacities to quench free radicals and to slow the skin aging process, which is believed to help keep them looking young.¹⁹ On the other hand, the anti-aging beverage products aimed at men are mostly traditional ones, arguably because men tend to believe in knowledge accumulated through long-term experience.

Conclusion

After comparing modern natural products beverages and traditional Chinese beverages, it is not difficult to find that they have almost the same properties in terms of anti-aging functions. This is explicable because both the Chinese medicines used in beverages and the sources of modern beverages are in fact similar edible plants. Moreover, traditional Chinese medicine very often uses a mixture of different herbs, whereas the nutritional additives of modern beverages are also from more than one source plant. Because both modern and traditional anti-aging beverages have anti-oxidant and other properties that are beneficial to aging-related ailments, they are expected to have important roles in supporting the growing elderly population.

Acknowledgments

This work was supported by the National Natural Science Foundation of China (Grant 81274048), Guangdong Provincial Department of Science and Technology (Grant 2012B090600025), the Fundamental Research Funds for the Central Universities (Grant 20103060101000167), and Guangdong Pharmaceutical University.

Author Disclosure Statement

No competing financial interests exist.

References

1. Ko KM, Chiu PY, Leung HY, Siu AH, Chen N, Leong EP, Poon MK. Long-term dietary supplementation with a yang-invigorating Chinese herbal formula increases lifespan and mitigates age-associated declines in mitochondrial antioxidant status and functional ability of various tissues in male and female C57BL/6J mice. *Rejuvenation Res* 2010;13:168–171.
2. Yang X, Zhang P, Wu J, Xiong S, Jin N, Huang Z. The neuroprotective and lifespan-extension activities of *Damnacanthus officinarum* extracts in *Caenorhabditis elegans*. *J Ethnopharmacol* 2012;141:41–47.
3. Shirin HR, Somayeh K, Neda N, Bagher L, Mohammad A. A systematic review of the efficacy and safety of anti-aging herbs in animals and human. *Asian J Anim Vet Adv* 2012;7:621–640.
4. Zhang H, Pan N, Xiong S, Zou S, Li H, Xiao L, Cao Z, Tunnacliffe A, Huang Z. Inhibition of polyglutamine-mediated proteotoxicity by *Astragalus membranaceus* polysaccharide through the DAF-16/FOXO transcription factor in *Caenorhabditis elegans*. *Biochem J* 2012;441:417–424.
5. Deng HB, Cui DP, Jiang JM, Feng YC, Cai NS, Li DD. Inhibiting effects of *Achyranthes bidentata* polysaccharide and *Lycium barbarum* polysaccharide on nonenzyme glycation in D-galactose induced mouse aging model. *Biomed Environ Sci* 2003;16:267–275.
6. Harunobu A, Norman RF. A review of botanical characteristics, phytochemistry, clinical relevance in efficacy and safety of *Lycium barbarum* fruit (Goji). *Food Res Int* 2011;44:1702–1717.
7. Ramesh T, Kim SW, Sung JH, Hwang SY, Sohn SH, Yoo SK, Kim SK. Effect of fermented *Panax ginseng* extract (GINST) on oxidative stress and antioxidant activities in major organs of aged rats. *Exp Gerontol* 2012;47:77–84.
8. Ma H, He X, Yang Y, Li M, Hao D, Jia Z. The genus *Epimedium*: An ethnopharmacological and phytochemical review. *J Ethnopharmacol* 2011;134:519–541.
9. Wang D, Liu M, Cao J, Cheng Y, Zhuo C, Xu H, Tian S, Zhang Y, Zhang J, Wang F. Effect of *Colla corii asini* (E'jiao) on D-galactose induced aging mice. *Biol Pharm Bull* 2012;35:2128–2132.
10. Tchantchou F, Chan A, Kifle L, Ortiz D, Shea TB. Apple juice concentrate prevents oxidative damage and impaired maze performance in aged mice. *J Alzheimers Dis* 2005;8:283–287.
11. Bauer JH, Goupil S, Garber GB, Helfand SL. An accelerated assay for the identification of lifespan-extending interventions in *Drosophila melanogaster*. *Proc Natl Acad Sci USA* 2004;101:12980–12985.
12. Baur JA, Pearson KJ, Price NL, Jamieson HA, Lerin C, Kalra A, Prabhu VV, Allard JS, Lopez-Lluch G, Lewis K, Pistell PJ, Poosala S, Becker KG, Boss O, Gwinn D, Wang M, Ramaswamy S, Fishbein KW, Spencer RG, Lakatta EG, Le Couteur D, Shaw RJ, Navas P, Puigserver P, Ingram DK, de Cabo R, Sinclair DA. Resveratrol improves health and survival of mice on a high-calorie diet. *Nature* 2006;444:337–342.
13. Pearson KJ, Baur JA, Lewis KN, Peshkin L, Price NL, Labinskyy N, Swindell WR, Kamara D, Minor RK, Perez E, Jamieson HA, Zhang Y, Dunn SR, Sharma K, Pleshko N, Woollett LA, Csiszar A, Ikeno Y, Le Couteur D, Elliott PJ, Becker KG, Navas P, Ingram DK, Wolf NS, Ungvari Z, Sinclair DA, de Cabo R. Resveratrol delays age-related deterioration and mimics transcriptional aspects of dietary restriction without extending life span. *Cell Metab* 2008;8:157–168.
14. Brown MK, Evans JL, Luo Y. Beneficial effects of natural antioxidants EGCG and alpha-lipoic acid on life span and age-dependent behavioral declines in *Caenorhabditis elegans*. *Pharmacol Biochem Behav* 2006;85:620–628.

15. Niu Y, Na L, Feng R, Gong L, Zhao Y, Li Q, Li Y, Sun C. The phytochemical, EGCG, extends lifespan by reducing liver and kidney function damage and improving age-associated inflammation and oxidative stress in healthy rats. *Aging Cell* 2013;12:1041–1049.
16. Christaki E, Bonos E, Giannenas I, Florou-Paneri P. Functional properties of carotenoids originating from algae. *J Sci Food Agric* 2012;93:5–11.
17. Liu Y, Song X, Zhang D, Zhou F, Wang D, Wei Y, Gao F, Xie L, Jia G, Wu W, Ji B. Blueberry anthocyanins: Protection against ageing and light-induced damage in retinal pigment epithelial cells. *Br J Nutr* 2012;108:16–27.
18. Andres-Lacueva C, Shukitt-Hale B, Galli RL, Jauregui O, Lamuela-Raventos RM, Joseph JA. Anthocyanins in aged blueberry-fed rats are found centrally and may enhance memory. *Nutr Neurosci* 2005;8:111–120.
19. Mukherjee PK, Maity N, Nema NK, Sarkar BK. Bioactive compounds from natural resources against skin aging. *Phytomedicine* 2011;19:64–73.

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Received: October 12, 2013

Accepted: October 13, 2013