Trends in food bioactives in the COVID-19 pandemic year—JFB audience

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Abstract

The World Health Organization (WHO) stated that COVID-19 could be characterized as a pandemic in March 11, 2020. As for the food industry and related sectors, food safety and security were the first subject of concern. Since there was no evidence that COVID-19 had any effect on food safety and security, the attention was changed to the potential of nutraceuticals and functional foods in positively affecting immunity in the context COVID-19. As for the feedstocks, our readership has shown a great deal of interest in fruits (e.g. pomegranate, grapes, berries, mushrooms, and soybean) and the industrial products thereof (e.g. wine, smoothies, miso), while lipids, peptides, and phenolic compounds were in the spotlight among the bioactive compounds. Considering the number of downloads of each paper, this report provides a cursory account of selected examples to illustrate the trends in food bioactives in the COVID-19 Pandemic Year.

Keywords: Coronavirus; SARS-CoV-2; Functional foods; Nutraceuticals.
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including vitamins and trace elements, and food bioactives, such as carotenoids and polyphenols, has been shown to be beneficial in enhancing immunity in viral infections. However, the authors highlight that the significance of these compounds in naturally occurring infections derives primarily from studies using animal models while the findings of human studies are inconsistent. According to these authors, nutritional approaches, including administration of food bioactives and micronutrients, may therefore have the potential to augment immune function and defend against COVID-19. Nevertheless, evidence evaluating dietary supplementation in COVID-19 is lacking. At that moment the authors concluded that a reliance on supplements to prevent or treat COVID-19 would be premature. A cursory account of the role of lipids in flavor formation was provided by Shahidi and Oh (2020). Lipid, as a major food component, contributes to the food flavor formation via both interactions with other components and/or due to its own degradation during food processing, cooking, and storage. According to the authors, this is particularly important when dealing with functional foods that may contain a high proportion of highly unsaturated oils. Consumer’s preference and sensory science were also in the spotlight in the last year. Yassin et al. (2020) worked with Brazilian smoothies and pointed out that of the 500 volunteers who participated in the evaluation work, 30% had never heard of smoothies. The regular consumers of smoothies were young student and single women residing in the southern region of Brazil. The strawberry, banana and pineapple were the preferred smoothie flavors. The flavor, residual taste, odor, color intensity, particle presence, homogeneity, turbidity and viscosity were the main terms generated in the sensory description. Additionally, the samples showed significant differences in the analytical parameters evaluated (e.g., phenols, ascorbic acid, and carotenoids), resulting in differences of 4.9, 5.4, 11.3 and 7.6 times on the antioxidant activity as evaluated by DPPH, ABTS, FRAP and CUPRAC assays, respectively.

Alzheimer’s disease (AD) is a progressive neurodegenerative disorder characterized by globally impaired cognitive functions. The perspective paper by Lange et al. (2020) worked with Brazilian smoothies and pointed out that of the 500 volunteers who participated in the evaluation work, 30% had never heard of smoothies. The regular consumers of smoothies were young student and single women residing in the southern region of Brazil. The strawberry, banana and pineapple were the preferred smoothie flavors. The flavor, residual taste, odor, color intensity, particle presence, homogeneity, turbidity and viscosity were the main terms generated in the sensory description. Additionally, the samples showed significant differences in the analytical parameters evaluated (e.g., phenols, ascorbic acid, and carotenoids), resulting in differences of 4.9, 5.4, 11.3 and 7.6 times on the antioxidant activity as evaluated by DPPH, ABTS, FRAP and CUPRAC assays, respectively.

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mer’s disease?” and the audience of JFB has shown that COVID-19 was not the only subject of interest during 2020. The authors highlight that, since it may influence inflammation and oxidative stress in the brain, diet has been recognized as a modifiable lifestyle factor capable of affecting the risk of developing AD. Dietary intake of natural antioxidants, such as polyphenols, carotenoids and vitamins C and E, is thought to reduce oxidative stress and to have preventive or therapeutic potential in AD. Several antioxidants have shown promise in animal models of AD. However, there is no evidence of clinical efficacy of natural antioxidants in people with AD. Therefore, the authors conclude that the assessment of the effectiveness of antioxidant-rich diets in AD deserves further investigation. This is actually similar to the findings of Lange and Nakamura (2020) when talking about the potential of supplementation with micronutrients and food bioactives in enhancing immunity in viral infections. Aromia berries have abundant levels of anthocyanins, proanthocyanidins, flavonols, and phenolic acids that may reduce the risk of non-communicable diseases. King and Bolling (2020) reported that aronia polyphenols are bioavailable, but the majority are transformed into low-molecular-weight phenolics. The authors summarized recent preclinical and clinical studies on the polyphenol bioavailability and health benefits upon aronia berry consumption to better understand its potential as a functional food. Alrifai et al. (2020) investigated different ratios of amber, blue and red LEDs on the synthesis of antioxidant phytochemicals in 8 species of the Brassica genus of microgreens. Their findings suggest the microgreens can be clustered into 3 groups based on phytochemical contents and sensitivity to the lighting: (i) high blue and amber dose-dependence producing high total phenolics and flavonoids content and DPPH antioxidant activity in radish, red Rambo microgreens; (ii) moderate to high sensitivity to overall lighting but no clear dose-dependence to the light in mustards Barbarossa and red kingdom; and (iii) mizunas, pac choi and other microgreens with various responses to lighting.

Food processing and effects on bioactive constituents (Shahidi, 2020) was addressed in the opinion piece published in the 12th volume. This manuscript highlights that while, palatability and wholesomeness of food are most important, over processing and inclusion of excessive amount of salt, sugar and solid fat with high content of trans isomers must be avoided. Additionally, while preservatives and additives are essential for safety of products and shelf-life extension, when and where possible natural products with established safety records should be used. The so-called, ultra-processed food (UPF) that may refer to products that do not follow these criteria are often associated with a myriad of diseases, but again here, caution must be exercised to avoid misuse of terminologies that may create misconception. Various nutraceutical and pharmaceutical potential, including antioxidant, anti-inflammatory, anti-tumor, immunomodulatory, antimutagenic activity, anti-virus, analgesic, antibacterial, antifungal, anti-hyperglycemic, and anti-hyperuricemia activities/effects, as well as main bioactive compounds including phenolics, terpenoids, polysaccharides, fatty acids, and alkaloids of chaga mushroom have been thoroughly reviewed by Peng and Shahidi (2020), and tabulated using a total 171 original articles. Besides, the up-to-date toxicity concerns and risk assessment about the misuse of chaga, which limit its acceptance and use as medicinal/nutraceutical products, have also been clarified. Miso, a paste of salted fermented soybean, which is a seasoning used extensively in traditional Japanese cuisine was studied by Shirako et al. (2020). Their results suggest that the short-chain hydrophobic pyroglutamyl peptides present in miso are effective in suppressing high fat diet-induced obesity in rats.

2. Concluding remarks and future trends

The COVID-19 Pandemic Year was marked by uncertainties in many areas. As for the food industry, the concern was initially related to the probable existence of SARS-CoV-2 contaminated food and if such contamination could be dangerous to the consumer. After one year, still there is no evidence that COVID-19 had any effect on food safety and security. Considering that immune function and inflammation are of great importance and that some nutraceuticals and functional foods present the potential to improve health, some authors have speculated that bioactive compounds present in these feedstocks would be of great importance in the context of COVID-19. This relates mainly to the expectation that immune-enhancing effect of certain foods/food ingredients may provide some level of protection in fighting viral infections. However, it is too early to have strong evidences in this direction. Future research in this area is expected to shed some light in terms of the potential of the nutraceuticals and functional foods to contribute in this and in future cases.

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