

Influence of heating on stability of γ -oryzanol in gluten-free ready meals

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Introduction. Rice is a rich source of γ -oryzanol, which is a mixture of lipophilic phytosterols composed of triterpene alcohols or sterols with ferulic acid ester. In recent years the usefulness of γ -oryzanol has been especially studied and highlighted for the treatment of diseases.

Therefore, given the great interest of γ -oryzanol from a nutraceutical standpoint, in this paper the effect of heating on the degradation of γ -oryzanol in rice pasta is studied, as it is a representative model of a gluten-free ready meal. The content of γ -oryzanol was determined in rice pasta (initially in chilled or frozen state) before and after cooking (in a steam pressure oven; in a conventional hot air oven; and in a microwave oven; and applying cooking times of 5 and 15 min). The results of this study show that raw pasta had a γ -oryzanol content of 7.63 ± 2.34 mg/kg if using white rice flour, and 65.60 ± 13.05 mg/kg when using brown rice flour. Chilled pasta samples prepared with brown rice flour, and cooked by microwave, had the greatest content of γ -oryzanol (approximately 80 mg/kg of rice pasta, wet basis).

The cases of celiac disease (gluten intolerance) are increasingly numerous in Western countries. Today, it is estimated that approximately 1:200-350 people in Europe and 1:250-500 in USA suffer from this disease. That is why the market increasingly demands gluten-free foods with higher quality and better price. In this sense, rice seems to be one of the most suitable cereals to develop gluten-free foods, due to its cost and nutritional, hypoallergenic, and color and mild flavor properties. In addition, rice has appreciable antioxidant properties due to its content of tocopherols, tocotrienols, γ -oryzanol and phenolic compounds. These are the reasons as to why antioxidants of rice bran and its oil also have a potential use as additives to improve the storage stability of foods, and to obtain fortified-functional foods. Rice is a rich source of fiber, vitamins B1, B2, B3 and D, and minerals such as Fe, Mg, Ca, and K. Brown rice (or whole grain) is obtained by dehulling. The removal of bran during milling decreases the lipids, proteins, antioxidants compounds, and starch level in the remaining kernel. The γ -oryzanol is found in both brown and white rice, but it is mainly in rice bran layers, and acts as a natural antioxidant to improve the brown rice stability. Like many other bioactive compounds that do not distribute uniformly in the cereal grain, it is concentrated in the husk and bran layer. Then, the whitening and polishing steps reduce approximately 94% of γ -oryzanol of the brown rice to become white rice. Therefore, the consumption of whole or brown grain in regular meals is strongly recommended, to provide health benefits beyond basic nutrition and to reduce the risks of many chronic diseases. Epidemiological studies suggested that the low incidence of certain chronic diseases in rice-consuming regions of the world might be associated with the antioxidant compounds contents of rice. However, compared to other cereals, rice does not appear to be an especially rich source of antioxidant compounds.

Conclusions. Thus, to experience the health benefits from γ -oryzanol, the compound must be stable during the heating of ready meals, since γ -oryzanol can be lost during thermal oxidation that could be produced during cooking. The bioactivity of γ -oryzanol has been revealed by many studies, although in recent years studies have especially focused on and highlighted the usefulness of γ -oryzanol for the treatment of diseases, including diabetes mellitus, hyperlipidemia, prostate cancer, and metabolic syndrome (a cluster of metabolic dysfunctions that includes hyperglycemia, hypercholesterolemia, hypertriglyceridemia and insulin resistance).