Effect of rice bran oil addition on the oxidative degradation and fatty acid composition of soybean oil during heating.

BACKGROUND: Rice bran oil (RBO) contains significant amounts of micronutrients (oryzanol, tocotrienol, tocopherol, phytosterols etc.) that impart a high resistance to thermal oxidation of the oil. The high oxidative stability of RBO can make it a preferred oil to improve the oxidative and flavor stabilities of other oils rich in PUFAs. In this study, the changes in the oxidative status and fatty acid composition in soybean oil (SO) blended with RBO under extreme thermal conditions were evaluated.

METHODS: The blends were prepared in a volume ratio of 10:90, 20:80, 40:60, and 60:40 (RBO:SO). The changes in the oxidative parameters and fatty acid composition of the samples during heating at frying temperature (170 & deg; C) were determined using analytical and instrumental methods. Oxidative alteration was also monitored by recording FTIR spectra of oil samples. RESULTS: The increase in oxidative parameters (free fatty acid, color, specific extinctions, peroxide value, p-anisidine value, and thiobarbituric acid value) was greater in pure SO as compared to RBO or blend oils during heating.This indicates that the SO samples incorporated with RBO have the least degradation, while pure SO has the highest. Blending resulted in a lower level of polyunsaturated fatty acids (PUFA) with   a higher level of saturated fatty acids (SFA) and monounsaturated fatty acids (MUFA). During heating, the relative content of PUFA decreased and that of SFA increased. However, the presence of RBO in SO slowed down the oxidative deterioration of PUFA. In FTIR, the peak intensities in SO were markedly changed in comparison with blend oils during heating. The reduction in the formation of oxidative products in SO during thermal treatment increased as the concentration of the RBO in SO increased; however, the levels of the protective effect of RBO did not increase steadily with an increase in its concentration.

CONCLUSIONS: During thermal treatment, the generation of hydroperoxides, their degradation and formation of secondary oxidative products as evaluated by oxidative indices, fatty acids and IR absorbances were lower in blend oils compared to pure SO. In conclusion, RBO can significantly retard the process of lipid peroxidation in SO during heating at frying temperature.

Source: Google Alert