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Health benefits of date palm: Phytochemicals and their functions

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Date palm (*Phoenix dactylifera* L), a tree of life or a "Bread of Desert" is widely grown in the hot arid regions and provides nutrition as a staple food and food security and raw material to the food industry. The date palm cultivation thrives in the hostile environment and its secondary metabolites are crucial to protect against both abiotic and biotic stresses. In recent years, plenty of research has been carried on the numerous health benefits of dates including identification and quantification of various classes of phytochemicals with a great potential uses in the booming industries of functional foods and nutraceuticals. The sale of herbal medicines is expected to get higher at 6.4% an average annual growth rate. Even though date fruits are rich in nutrition, minerals, sugar and phytochemicals and its global market share is extremely low. Date fruit needs to be promoted as a health food for infants, youth, healthy adults as well as patients with chronic diseases. However, the quality and consistency of the products are most challenging issues facing the plant-based medicines. They are contaminated with microbes and soil contaminants such as heavy metals, herbicides, pesticides and other agricultural chemicals which can cause qualitative and quantitative changes in the levels of medicinal metabolites. Overall production of medicinal metabolites in plants is affected by plant genotype, cultivation, harvesting, processing and distribution. Research will be highlighted on the phytochemical composition, nutritional value and potential health benefits of date fruit consumption, e.g., laxative, anti-inflammatory activity, nutrient deficiency for malnutrition prevention

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Gossypol Acetic Acid prevents oxidative stress-induced RPE necrosis by regulating FoxO3/SESTRIN2 pathway

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The late stage of dry Age-Related Macular Degeneration (AMD) or Geographic Atrophy (GA) is characterized by extensive Retinal Pigment Epithelial (RPE) cell death and the cure is not available currently. We have recently demonstrated that RPE cells die from necrosis in response to oxidative stress, providing a potential novel mechanism for RPE death in AMD. In this study, we screened FDA-approved natural compounds for their ability to prevent oxidative stress-induced RPE death. We identified Gossypol Acetic Acid (GAA) as a potent inhibitor of oxidative stress-induced RPE cell death. GAA induces anti-oxidative response and inhibits accumulation of excessive Reactive Oxygen Species (ROS) in cells, through which it prevents the activation of intrinsic necrotic pathway in response to oxidative stress. Sestrin2 (SESN2) gene is found to be sufficient and necessary for mediating GAA function in anti-oxidative response and RPE survival upon oxidative stress. Moreover, FoxO3 is further found to be required for GAA mediated SESN2 expression and RPE survival. Mechanistically, GAA promotes FoxO3 nuclear translocation and binding to the SESN2 enhancer, which in turn increases its transcriptional activity. This establishes a critical role for FoxO3/SESN2 axis in regulating RPE survival in response to oxidative stress. Taken together, we have identified GAA as a potent inhibitor of oxidative stress-induced RPE necrosis by regulating FoxO3/SESN2 pathway. This study may have significant implication in the therapeutics of age-related diseases, especially GA.

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