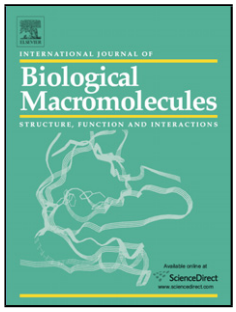

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Synthesis and antioxidant property of novel 1,2,3-triazole-linked starch derivatives via 'click chemistry'

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Abstract

Based on the copper (I) catalyzed Huisgen azide-alkyne cycloaddition (click chemistry), the novel synthesis of a variety of 1,2,3-triazole-linked starch derivatives was developed, including 6-hydroxymethyltriazole-6-deoxy starch (**HMTST**), 6-hydroxyethyltriazole-6-deoxy starch (**HETST**), 6-hydroxypropyltriazole-6-deoxy starch (**HPTST**), and 6-hydroxybutyltriazole-6-deoxy starch (**HBTST**). Their antioxidant properties against hydroxyl-radical, DPPH-radical, and superoxide-radical were evaluated *in vitro*, respectively. The antioxidant activity of the obtained novel amphiprotic starch derivatives via 'click reaction' exhibited remarkable improvement over starch. And the scavenging effect indices of most of the products were higher than 60% at 1.6 mg/mL against hydroxyl-radical and DPPH-radical. Moreover, the scavenging effect of the products against superoxide-radical attained 90% above at 0.1 mg/mL. Generally, the antioxidant activity decreased in the order: **HBTST** > **HPTST** > **HETST** > **HMTST** > **starch**. Furthermore, the order of their antioxidant activity was consistent with the electron–donating ability of different substituted groups of the 1,2,3-triazoles. The substituted groups with stronger electron supplying capacity provided more electrons to the various radicals, which relatively enhanced the capacity for scavenging free radicals.

Keyword

Starch derivatives; Click chemistry; Antioxidant activity

Introduction

Reactive oxygen species (ROS), including hydroxyl radicals ($^{\bullet}OH$), hydrogen peroxide (H_2O_2), and superoxide anion ($O_2^{\bullet-}$) [1-3], can induce damage to cellular constituents [4], which can cause neurodegenerative diseases such as Alzheimer's and Parkinson's diseases, cancer, hypertension, diabetes, and many other diseases associated with aging in biological systems [5-9]. The role of antioxidants has received increased attention during the past decades. However, the use of synthetic antioxidants, such as butylated hydroxyanisole, butylated hydroxytoluene, and propyl gallate, has potential health

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