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Preparation, Characterization of some Thiazolidine Derived from Penicillamine and their Antioxidants Activity

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ABSTRACT

A new series of thiazolidine-4-carboxylic acid derivatives of penicillamine have been synthesized in one step by cyclization of penicillamine with different aromatic aldehydes. The optimized reaction conditions for this one -pot reaction were achieved. The products were obtained in short reaction times, high yields and high purities". All products were characterized and identified by FT.I.R and ^{1}H-NMR spectroscopy and Finally in vitro antioxidant potential for the new prepared products was evaluated according to the 1,1-diphenyl-2-picrylhydrazyl (DPPH)"radical scavenging assays. Some of synthesized compounds showed a good antioxidant activity which supports the favorable influence of the structural modulation on the antioxidant effects of the aromatic aldehydes".

KEYWORDS

D-penicillamine, Thiazolidine, Antioxidants, DPPH.

Introduction

In recent years, heterocyclic compounds containing sulfur and nitrogen as heteroatoms have received considerable attention because of their medicinal and pesticidal importance, thiazolidine belongs to a class of heterocyclic compounds having two hetero atoms a sulfur and nitrogen as part of the saturated five-member ring, in the form of thio-ether group at position 1 and amine group at position3, with three carbon atoms. Also called by name tetrahydrothiazoles (Victoria *et al* 2013). Thiazolidine derivatives "attracted attention of researchers in recent years because, this class of compound has an important properties and applications, especially in natural product, medicinal chemistry, agrochemical agents, bioorganic and organocatalytic, where many of them have been used as synthetic intermediates, auxiliary reagents, ligands or asymmetric synthesis catalyst(Lodhi et al., 2014; Rambo et al., 2015)."Scientists had developed a myriad of new compounds related to this moiety and investigated for different "pharmacological "activities with least side effects. Thiazolidine-4-carboxylic acid (TC)"and 2-substituted are unnatural amino acid analogs of L-proline, in which a sulfur atom replaces the $^{\gamma}$-carbon in the 5-member ring of proline, sporting a thiazolidine instead of a pyrrolidine ring (Choudhary et al., 2011). To be particular, 2-arylthiazolidine carboxylic acids and derivatives are an important thiazolidine derivatives, are immensely important due to their multiple activities as antimicrobial(Song *et al*, 2015), anti-inflammatory (Hansen, *et al*, 2018) & (Jagtap *et al*, 2018), anticancer (Gududuru, *et al*., 2005) & (Onen-Bayram *et al*, 2012), and has utility as a therapeutic agent for the treatment of dementia and amnesia disorders(Furukawa *et al* 1989), HIV protease inhibitor (Hidaka, *et al*, 2009), immunomodulators (Pellegrini *et al*, 1999), antifungal (Abid *et al*, 2019), antitubercular (Nagasree *et al* 2018), analgesic, anti-viral, antiplatelet, antimalarial, anticonvulsant, cardio protective (Bayram, *et al*, 2016), DPP-IV inhibitor for treatment of type 2 diabetes, antioxidants etc (Yoshida *et al*, 2007).

The discovery of thiazolidines-4-carboxylics was accidentally made by Birch and Harris (Harris & Birch 1930), during the study of the effect of formaldehyde on the amino acid titration curves". "Later, in 1936, Schubert (Schubert, 1935) was the first to explain the formation of thiazolidines through the condensation of cysteine and formaldehyde followed by an intramolecular cyclization. Consequently, a large number of thiazolidine-4-carboxylic acid can be synthesized by condensation of aldehydes or ketones with cysteine and / or penicillamine, according to Scheme 1. When an aldehyde or a non-symmetric ketone is used, the cyclization results in a new chiral center in C2 thus creating a mixture of diastereoisomers (Kallen, 1971).