RESEARCH ARTICLE

Anti-oxidant Activity of Naproxen and Its Diorganotin Complexes

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ABSTRACT

In this research, we study the anti-oxidant properties of naproxen and its synthesized complexes. The complexes 1-3 give the highest anti-oxidant activity with DPPH than the starting material (naproxen). The diorganotin (IV) complexes were synthesized by the condensation reaction of naproxen with organotin (IV) chlorides (R_2SnCl_2; R= Bu, Ph and Me). The chemical structures and characterizations of Sn (IV) complexes have been checked by the elemental analyses and various spectroscopic data (^{1}H-, ^{13}C-, and FTIR spectroscopy). The tin complexes with different substituents were applied to study the anti-oxidant properties of naproxen and its complexes. The synthesized complexes gave higher values than naproxen; also, methyl substituent 1 was the highest one than others.

Keywords: Anti-oxidant activity, DPPH, Naproxen, Radical scavenging.

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INTRODUCTION

Current studies and discoveries on the biological and chemical effects of the metal complexes play an important position in agriculture, pharmacy besides industrial chemistry.[1] Many investigations have been used metal complexes with drugs as therapeutic agents.[2-6] Recent work on the complexes of the elements has shown that the association of the drug with the elements improves its activity; also it was found that the complex has this activity while the original compound does not. Therefore, we possess reasons to investigate the properties of naproxen and its gained complexes such as diorganotin and to analyze the various biological properties to obtain new potential for using various naproxen derivatives compounds for therapeutic purposes. Some authors have pointed out the anti-oxidant capacity of certain flavonoids, such as quercetin, increases after complicated by the use of metallic moiety.[7-9]

Naproxen, propionic acid 2- (6-methoxynafthaline-2), is an important common type of propionic acid. Propionic acid products for the joint swelling, care of pain and symptoms Arthritis is thought to block the achievement of the cyclooxygenase (COX) included in creating prostaglandins that are made as reaction to an injury or a specific one Disease and source pain, infection, and swelling. Conversely, this work is correlated by way of some gastrointestinal side influences that the current free acid group may cause. It was therefore believed that hiding this free acid group is the possible solution to the problem.[10] In 2009, a new naproxen drug with beneficial anti-oxidants was developed by synthesizing the tocopherol (Figure 1) containing naproxen ester γ-tocopherol because of its potent anti-oxidant properties and anti-inflammatory effects.[11]

In general, organotin (IV) compounds have many applications; in particular, those derived from carboxylate ligands[12-15] were exhausting examination to get the best performing that varying with the ligand bound to the organotin fragment, also the source of the organic part.

The accumulation of free radicals in the human body can lead to many diseases caused by oxidative stress.[16] Studies in the literature have long reported that free radicals are important for the progression of various diseases in aging, such as cancer, cardiovascular disease, diabetes mellitus, emphysema, cataracts, and liver cirrhosis, arthritis, inflammation, and Brain Diseases.[17] Fortunately, the formation of free radicals can be reduced by anti-oxidants that catch and neutralize freely Radicals.[16,17]

This paper reports the anti-oxidant properties of naproxen and the complexes derived from it to see whether the activity is increased with the metallic center occurrence.

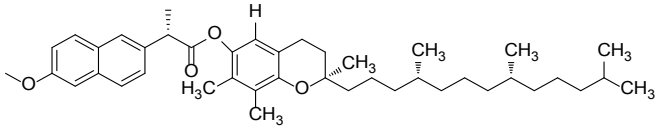

Figure 1: Naproxen Ester γ-Tocopherol

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MATERIALS AND METHODS

Synthesis of Di-Sn(IV) Complexes 1–3

Three complexes of naproxen-Sn(IV) (1–3) were synthesized via the condensation reaction of naproxen (ligand) (2 mmol equivalents) and (1 mmole) diorganotin (IV) chlorides (Bu, Ph, or Me-tin dichloride).[10] The solution of naproxen (0.46 g, 2.0 mmol) in methanol (30 mL) was added slowly to the warm solution of the appropriate dialkyltin chloride (Bu, Ph or Me-tin dichloride) (1.0 mmol) in methanol solvent. The resultant mixture was refluxed at the boiling point for 8 hours; after that, the methanol solvent was removed under vacuum. The solid complex was recrystallized to produce the relating tin (IV) complex (1–3).

DPPH Free Radical Scavenging Activity

An equivalent volume of an ethanol compound solution was added to a DPPH-ethanol solution (0.1 mm). The concentration of the solution of the compounds was 0.1 mM. The control solution that was used is ethanol. The absorbance was recorded at a wavelength of 517 nm at room temperature after a period of 20 and 60 minutes for a time dependency study of 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity.[20] The radical scavenging activity was expressed as the DPPH radical scavenging activity of the compounds was stated as the percentage reduction of the absorbance values of the initial DPPH solution and calculated as per the following equation:

$$I(\%) = (A_{blank} - A_{sample} / A_{blank}) \times 100$$

A_{blank} is the absorbance of the control (containing all the reagents except the testing compound), and A_{sample} is the absorbance of the experimental sample with all reagents.

The measurements were repeated three times, and the average value was taken. In this method, ascorbic acid was used as the standard anti-oxidant.

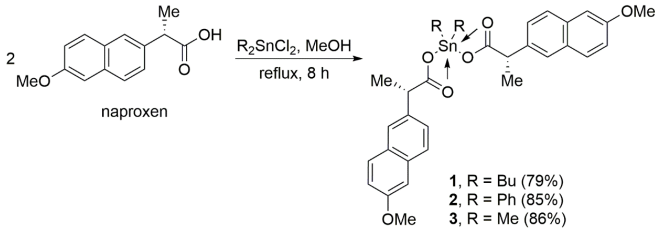

Figure 2: Synthesis of Di-Sn(IV) Complexes 1–3.

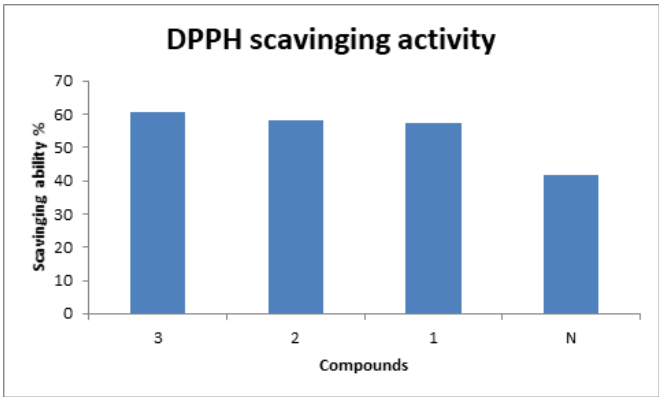

Figure 3: DPPH-radical scavenging activity of Nap and its derivatives.

RESULTS AND DISCUSSION

The complexes (1-3) were synthesized[10] by the reaction of 2 mol, naproxen, and 1mol of diorganotin chloride, as in Figure 2.

DPPH Scavenging Activity

The degradation of hydrogen roots is an important anti-oxidant mechanism. DPPH (2, 2-Diphenyl-1 Becquerel Hydrazil) contains hydrogen-free roots with an apparent absorption at 517 nm, making it easy to recognize because the violet color of the DPPH solution quickly disappears when it reacts to a proton drop in the proton.[21,22] The DPPH radical scavenging activity of Naproxen and its complexes exhibited good scavenging ability (Figure 3), but the complexes gave the highest values as compared with naproxen (ligand). It's increased from 41.7222 for Nap to (57.3889, 58.2778, and 60.5) for (1-3). Complex 3 was the best anti-oxidant as compared with the other complexes, this may be related to the symmetrical and stable structure of complex 3, as well as low steric effect of the same complex.

The literature reports of metallic complexes where the ligand has anti-oxidant activity, and it is expected that the metal moiety increases its activity.[23,24] In this case, the three complexes have the same metal (Sn) at the same concentration, but the difference was in the high content of tin in complex 3 as compared with others. Additionally, all complexes were not shown time dependency.

CONCLUSIONS

DPPH radical scavenging activity was used to determine the anti-oxidant power of naproxen and derived complexes with diorganotin compounds. Diorganotin complexes gave higher DPPH than the starting material (naproxen), and methyl complex was the best compared with others.

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