Malaysian Journal of Science **25** (2): 97 – 106 (2006)

Synthesis and Biological Properties of Zinc(II) Complexes of some 2-hydroxyacetophenone-benzoylhydrazones

Hapipah M. Ali[1,*], Siti Nadiah Abdul Halim[1], Puvaneswary Subramaniam[1], S.M. Zain[1], W. Jefri Basirun[1], Endom Ismail[3], Noorlidah Abdullah[2] and H.L. Teoh[2]

[1] Department of Chemistry, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia.
* hapipah@um.edu.my (corresponding author)
[2] Institute of Biological Science, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia.
[3] National University of Malaysia. 43600 Selangor, Malaysia.
Received 1st June 2005, accepted in revised form 27th March 2006.

ABSTRACT The new zinc(II) complexes have been prepared in ethanol by condensation of 2-hydroxyacetophenone with either benzhydrazide or 3-methoxybenzhydrazide and zinc acetate in the presence of triethylamine. The IR, ^{1}H, ^{13}C NMR and UV-visible data show coordination of hydrazone ligands to the metal centers and the spectroscopic data augur well with the x-ray structures which had been published earlier. The Schiff bases and their complexes were screened for antimicrobial, cytotoxic and antioxidant activities. The anti-microbial activities of the ligands and complexes were evaluated by using plate diffusion method against some gram-positive bacteria, gram-negative bacteria and two fungi. There was growth inhibition exhibited by ligands and zinc(II) complexes against tested bacteria and fungi. The Schiff base, H_2hapbh was cytotoxic with IC_{50} 10.0 μgml^{-1} against the MCF-7 (human breast cancer cells) while both zinc(II) dimer complexes were strongly cytotoxic with IC_{50} values of 4.5 μgml^{-1}. The Schiff bases and zinc(II) complexes showed higher antioxidant activity than quercetin or vitamin E and is comparable with butylated hydroxytoluene (BHT), a commercially used synthetic antioxidant.

ABSTRAK Kompleks zink(II) yang terbaru disediakan dalam etanol dengan mengkondensasi 2-hydroksiasetofenon dengan benzhidrazida atau 3-metoksibenzhidrazida beserta zink asetate dengan mencampurkan sedikit trietilamina. Data IR, NMR ^{1}H, ^{13}C dan UV-nampak menunjukkan pengkoordinatan ligan hidrazon kepada logam dan data ini menyetujui struktur sinaran-x yang telah diterbitkan. Aktiviti anti-mikrob, sitotoksik dan pengoksidaan bes Schiff dan kompleks zink(II) telah dikaji. Aktiviti anti-mikrob telah dijalankan dengan menggunakan kaedah pembauran plat terhadap bakteria gram-positif dan gram-negatif beserta dua fungi. Terdapat perencatan ketumbuhan bakteria dan fungi apabila diuji dengan ligan dan kompleks zink(II) ini. Bes Schiff, H_2hapbh menunjukkan sitotoksik dengan IC_{50} 10.0 μgml^{-1} terhadap MCF-7 (sel kanser payu dara) sementara kedua-dua kompleks dimer zink(II) menunjukkan sitotoksik yang tinggi, nilainya IC_{50} 4.5 μgml^{-1}. Bes Schiff dan kompleks zink(II) menunjukkan aktiviti pengoksidaan yang tinggi daripada quercetin atau vitamin E dan sama nilai dengan agen pengoksidaan komersial, butylated hydroksitoluena (BHT).

(Hydrazone Schiff bases, zinc(II) complexes, cytotoxicity, antioxidant and antimicrobial activities).

INTRODUCTION

The reactivity of the metals with the nitrogen-oxygen donors have been systematically investigated and continue to be an important area of research [1]. The zinc complexes of benzoylhydrazones ortho-hydroxy aldehydes are receiving continuous attention due to their structural, electron transfer and as models for metalloenzymes containing zinc as the active sites [2]. However metal complexes of the ketone analogs are rare and not intensively investigated.

Compounds (1) and (2) provides potentially tridentate ligands with ONO donor atoms which form stable chelate with metal ions. In fact the first metal complex of this type of ligand was copper complex with benzoylhydrazones derived