Synthesis and characterization of cobalt(II), nickel(II), copper(II), zinc(II) and cadmium(II) complexes of benzyl N-[1-(thiophen-2-yl)ethylidene] hydrazine carbodithioate and benzyl N-[1-(thiophen-3-yl)ethylidene] hydrazine carbodithioate and the X-ray crystal structure of bis{benzyl N-[1-(thiophen-2-yl)ethylidene] hydrazine carbodithioate}nickel(II)

ABSTRACT

Two bidentate Schiff bases have been synthesized by reaction of S-benzyldithiocarbazate with 2-acetylthiophene and 3-acetylthiophene to give benzyl N-[1-(thiophen-2-yl)ethylidene] hydrazine carbodithioate (SB2ATP) and benzyl N-[1-(thiophen-3-yl)ethylidene]hydrazine carbodithioate (SB3ATP). The SB2ATP and SB3ATP were then reacted with five metal ions, cobalt(II), nickel(II), copper(II),zinc(II) and cadmium (II) to form 10 metal complexes, all of general formula ML2. The compounds synthesized were assayed for their bioactivities against selected pathogens and cancer cells. X-ray crystal structure analysis of Ni(SB2ATP)2 showed it to be a distorted square planar complex. All the compounds are non-electrolytes in DMSO. Cu(SB2ATP)2 showed strong activity towards Candida lypolytica.SB2ATP, SB3ATP, Co(SB2ATP)2, Cd(SB2ATP)2 and Cu(SB3ATP)2 showed weak activity against several microbes and fungi while the others showed no activity toward these targets. SB2ATP and Cd(SB3ATP)2 showed significant bioactivity towards human myeloid leukemia (HL-60) while Co(SB3ATP)2 showed slight cytotoxic activity towards this cell line. SB2ATP, SB3ATP, Co(SB2ATP)2,Cu(SB2ATP)2, Cu(SB3ATP)2, Zn(SB2ATP)2 and Cd(SB2ATP)2 showed significant chemotherapeutic activity against human breast carcinoma with positive estrogen receptor (MCF-7) while the remainder of the compounds showed significant bioactivity. The Schiff bases displayed higher cytotoxic activity compared to their metal complexes except for Cu(SB3ATP)2. None of the compounds showed any cytotoxic activity towards human cervical cancer (HeLa) or towards human breast carcinoma with negative estrogen receptors(MDA-MB-231).

Keyword: S-Benzyldithiocarbazate, Dithiocarbazate derivatives, 2-Acetylthiophene, 3-Acetylthiophene, Schiff base