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Synthesis and antibacterial activity studies of some Transition Metal Piperine Complexes

B.H.M. Gayan B. Wijeratne[1], Sujatha Hewage[1]*
Department of Chemistry, University of Colombo, Colombo 03

One of the key areas of sharp focus of present day scientists is the discovery of novel bioactive metal complexes. The highest challenge to synthesize novel metal complexes is the design and synthesis of novel ligands, which is highly limiting and costly. Therefore, the utilization of naturally occurring compounds as ligands have caught the interest of many studies, which had generated some of the most highly potent complexes in medicine and in other applications. For instance, recent studies have reported high levels of gold accumulation by piperine in acidic medium.

In the current study, we have extracted and purified piperine, the main alkaloid constituent present in the fruit of Sri Lankan black pepper (*Piper nigrum*). Using purified piperine we have prepared transition metal complexes of gold, silver and chromium. These complexes have been characterized by FT-IR spectroscopy, UV-Visible spectroscopy and melting point determination. All these methods support a weak complex formation between piperine and metal ions. Piperine required an acidic medium in order to bind to all the metals, which can be accounted for by a probable displacement of electrons described by a previous study. The expected structural changes in piperine in the acidic medium are clearly evident in the FT-IR spectra. The novel complexes were studied for their antibacterial bioactivity in nutrient agar medium using well diffusion method. Our studies show that the silver complex is highly active while chromium and gold complexes are moderately active as shown by values in Table 1. The highly positive results on antibacterial studies indicate that these complexes are of high potency for future pharmaceutical applications.

Table 1: Results obtained from antibacterial studies on piperine (Pip) and its metal complexes Genus of bacteria	**Control**	**Piperine**	**Pip-Cr**	**Pip-Au**	**Pip-Ag**
Staphylococcus sp	~	1.0	1.6	1.4	2.1
E.Coli	~	~	~	~	1.1
Streptococcus sp	~	~	1.6	2.2	2.0
Klebsiella sp	~	~	~	1.7	1.3
Bacillus sp	~	1.5	~	0.8	~

All values indicate average diameter (in triplicate) of zone of inhibition measured in centimeters ± 0.05 cm. ~ indicate null results in the table and pure DMSO (solvent) was used as the control.

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