

4	SBL- Ni ²⁺	MS	S	S	S	R	MS	R	S
6	Standard ₁ *	-	-	-	MS	-	MS	MS	-
7	Standard ₂ *	-	-	-	-	-	-	MS	-
8	Control	-	-	-	-	-	-	-	-

Key: S: Sensitive; MS: Mild Sensitive; R: Resistance; -: Negative (no reaction); C: Control; Standard₁: Augmentin; Standard₂: Terbinafine

The data in Table 7 below shows results for the zone of inhibition tests of the products against some of those pathogens that showed positive sensitivity (MIC) tests in Table 5. It also indicates the regions (in mm) where those pathogens are killed or their growth is inhibited by the compounds, with the Schiff base having the smallest inhibition zone (5 mm, 7 mm, 10 mm, 8 mm and 7 mm), followed by the Fe (II) complex (12, 22 and 25

mm), Ni²⁺ (13, 16, 21 and 23 mm), and the Co²⁺ complex having the largest inhibition zone (10, 18, 20, 23, and 26 mm, respectively) [20]. The negative test result for the control agar plate is less than 0.01 mm. This indicates that all the microbes grow freely in the absence of the compounds.

Table 7: Shows Zone of Inhibition (ZI) test results of the Schiff base ligands and their metal (II) complexes in (mm).

S/No	Compound	MRSA	<i>S. pneumonia</i>	<i>E. klebsiella pneumoniae</i>	<i>ESBL E. coli</i>	<i>Shigella spp</i>	<i>Salmonella spp</i>	<i>C. albicans</i>	<i>A. nigger</i>
1	SBL	-	-	5 ± 0.2	7 ± 0.2	10 ± 0.4	-	8 ± 0.3	7 ± 0.1
2	SBL-Fe ²⁺	-	-	22 ± 0.1	-	25 ± 0.3	-	12 ± 0.2	-
3	SBL-Co ²⁺	20	23 ± 0.5	26	18	-	-	20 ± 0.2	10 ± 0.5
4	SBL-Ni ²⁺	21 ± 0.5	-	-	23 ± 0.5	-	13	23 ± 0.2	16 ± 0.4
5	Control	-	-	-	-	-	-	-	-
6	Standard ₁ *	11	-	15	13	-	17	-	-
7	Standard ₂ *	-	-	-	-	-	-	8.5	10

Key: S Sensitive; MS Mild Sensitive; R Resistance; - Negative (no reaction); C Control; Standard₁ Augmentin; Standard₂ terbinafine

Table 8 shows the MBC and MFC results of the test compounds, based on the preliminary in vitro antimicrobial activities of the ligand and the complexes. They were screened for their minimum inhibitory concentrations and in vitro antimicrobial actions against the selected microbes [21]. The minimum active concentrations were measured in g/mL, and two standards were used (Augmentin and Terbinafine for fungal spp.). The results revealed that the complexes were more

significantly active for killing the pathogens than the ligand, and the overall activities of all three complexes were found to be very effective, even at very low concentrations of less than 250 g/mL, which is being considered to be the minimum concentrations of the Schiff base and complexes required to kill (99.99%) of the pathogens completely [22].

Table 8: Table 8: Shows results of Minimum Bactericidal (MBC) and Fungicidal Concentrations (MFC) ($\mu\text{g}/\text{mL}$) for the Schiff base, metal complexes and standard drugs against the Pathogens used for the study.

S/No	Products	MRSA	<i>S. pneumoniae</i>	ESBL <i>K. pneumoniae</i>	ESBL <i>E. coli</i>	<i>F. shigella</i>	<i>S. typhi</i>	<i>C. albicans</i>	<i>A. nigger</i>
1	SBL	++	+++	--	-	--	+++	--	--
2	SBL-Fe ²⁺	++	++	---	++	---	+++	--	+
3	SBL-Co ²⁺	---	--	--	-	+	+	---	--
4	SBL-N ₁ ²⁺	---	++	+	--	++	--	--	--
5	Standard ₁ * (mg/mL)	+++	----	----	----	+++	----	+	+++
6	Standard ₂ * (mg/mL)	+	+++	+	+++	+	++	----	+
7	C	+++	+++	+++	+++	+++	+++	++	+++

Keys: ++++: very intense microbial growth; +++: high microbial growth (100 -250 mg/ml); ++: moderate microbial growth; +: mild microbial growth; -: No growth slightly clear at (215 $\mu\text{g}/\text{mL}$); --: No growth very clear at (250 $\mu\text{g}/\text{mL}$); ---: No growth; very -very clear at (500 $\mu\text{g}/\text{mL}$); ----: No growth immediate sharp clear at (1000 $\mu\text{g}/\text{mL}$); C: control; Standard₁*: Augmentin; Standard₂*: Terbinafine

Conclusion

Novel Schiff base and new metal (II) complexes has been synthesised, spectroscopic studies has been used to characterized the structure of the Schiff base ligand coordinates with metal ions through the deprotonated hydroxyl, a carbonyl oxygen and nitrogen of the azomethine group. Geometries of the complexes shows that they are all octahedral and the Schiff base ligand is bidentate. The compounds were subjected to test for antimicrobial activities against some infectious pathogen and found to be significantly effective compared to the commonly used antibiotics.

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