

Synthesis, Characterization and Biological Activity study of New Zinc Metal complex prepared from 2-hydroxy 4, 5-dimethyl Chalcone derivatives.

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Abstract

The innovative Zn(II) transition metal complex derivatives were synthesised by using 2-hydroxy 4,5 dimethyl substituted Chalcone derivatives like 2-Fluro chalcone,3-fluro chalcone,3-nitro chalcone, 2-trifluro methyl chalcone, 2 hydroxy -5-bromo salicylaldehyde chalcone and 1-Naphthyl chalcone with Zinc salts in presence of alkaline water as solvent media.

The prepared metal complex were characterised by elemental analysis, conductivity measurement, IR spectra, UV-visible spectra and TGA analysis. The synthesised compounds have been evaluated against three antibacterial strains and three antifungal strains. Also the metal complex were estimated for antioxidant and anticancer activity. The chalcone acts as bidentate ligand and coordinating through hydroxy and carbonyl oxygen atoms. The biological activity reveals that most of the metal complexes are active against selected microbes like Escherichia Coli, Pseudomonas aeruginosa, Staphylococcus aureus, Aspergillus Niger, Candida albicans, Penicillium crysogenum. In this paper we wish to report the synthesis of Zn (II) complexes with Chalcone and their characterisation data.

Keywords: 2-hydroxy-4, 5-dimethyl Chalcones, Zinc salts, Metal Complexes, TGA, Spectral studies and

Antibacterial, Antifungal, Antioxidant and In vitro Cytotoxicity.

1. Introduction

The chemistry of chalcone has generated extensive scientific studies throughout the world. Mainly attention has been focused on the synthesis and biodynamic activities of chalcones. The name "Chalcones" was introduced by Kostanecki and Tambor [1]. In chalcones, two aromatic rings are connected by an aliphatic three carbon chain. Chalcone bears a very good synthon so that variety of novel metal complex with good pharmaceutical profile can be designed. Chalcones are very reactive compounds and their reactivity is due to ketoethylenic group. They undergo variety of chemical reactions and useful in the synthesis of numerous chalcone metal complex, heterocyclic compounds like Flavones, Flavonone and flavonols. The radical quenching properties of the phenolic groups (OH) present in many chalcones have higher interest in the use of formation of metal complexes. Chalcone-rich plant extracts as either drugs or food preservatives. [2]. Chalcones have been reported to possess many useful properties due to existence of α , β -unsaturated ketone moiety in Chalcones give rise numerous pharmacological activities such as antimicrobial [3], antitumor [4], anticancer [5], radical scavenger [6] and inhibitor of topoisomerase-I[7]. Chalcone derivatives from nature or synthesis

possess antimicrobial activity. The Chemistry of Chalcone metal complexes shows on the important fields of chemistry, it has generated rigorous scientific studies in the world. In the complexes, the metal ion is present at the center and has capacity to accept a lone pair of electrons. The geometric shapes of the complexes depend on the coordination number of the metal complex, shapes of metal complex of chalcones are tetrahedral, square planar or octahedral [8]. A coordination complex or metal complex involve a central atom or ion is called coordination centre, and a surrounding array of bound molecules or ions known as ligands [9]. Many metal-containing compounds, especially those of transition metals, are coordination complexes [10]. The atoms N, O & S are common donor presents in the ligand. The formation of metal complexes from chalcones, chalcones have been used as ligands. They can act as bidentate, monodentate or polydentate species towards the metal complexes depend on the number of donor atoms present in the chalcones. The conventional chalcone skeleton provides two possible metal coordination sites which both were proposed to be involved in metal binding in the complexes (i) keto oxygen atom as a monodentate r-donor and (ii) the enone p-system as a p-donor and -acceptor ligand in g4-coordination mode. The complexes of metallic salts are more potent and less toxic in many cases as compared to the parent drug [11]. These metal complexes are found to be interesting due to their biological application like antifungal [12], antibacterial [13] and anti-tumor [14] activities. 2-Hydroxy chalcone complexes and its derivatives have been reported as an anti-HIV agent [15]. Zinc is an essential element for normal functioning of most organisms and it is the main constituent in a number of metalloenzyme [16, 17]. It functions as an antioxidant and is involved in many important biochemical reactions [18] in the body. It is the second most abundant transition metal ion in human body after iron. The Zn (II) ions have a high affinity towards oxygen, nitrogen and sulphur donor ligands [19, 20]. The chelating tendency of these compounds generally increases biological activity.

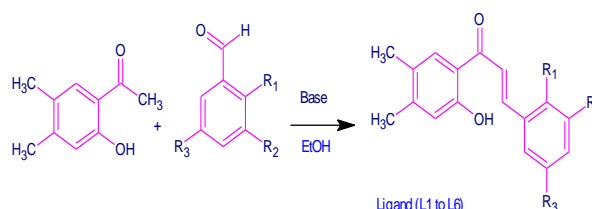
2. Experimental

2.1 Material and Methods.

Materials used in this process were purchased from commercial sources and key components were tested in-house. The metal salts were used in anhydrate forms.

2.2 Synthesis of 2-hydroxy-4, 5-dimethyl substituted chalcone

The starting materials 2-hydroxy -4, 5 dimethyl substituted chalcones synthesized as per reported [21] procedure. (Refer Fig .1 Reaction scheme).



L1: R₁ =F, R₂=H, R₃=H; **L2:** R₁ =H, R₂=F, R₃=H; **L3:** R₁ =H, R₂=NO₂, R₃=H; **L4:** R₁ =CF₃, R₂=H, R₃=H; **L5:** R₁ =OH, R₂=H, R₃=Br; **L6:** R₁ & R₂=Phenyl ring attached R₃=H

Fig.1. Scheme for the synthesis of 2-hydroxy 4, 5-dimethyl substituted chalcone.

2.3 Preparation of metal complex

Chalcone 0.0037 mole was dissolved in sodium hydroxide solution (25 mL of 0.5 molar) with constant stirring. Further heated the reaction mixture at 80°C and stirred for 1.0hr. Cooled the reaction mixture to ambient temperature and pH was adjusted to 8.0 by dilute hydrochloric acid. To this methanol was added (to make clear solution) followed by addition of Zinc chloride (5mL of 0.00185 mole) solution in water, refluxed for three hrs. The reaction mixture was cooled to room temperature and precipitation observed in 2-3 hrs. The precipitate was filtered and washed with excess water to remove impurities. Finally, solid material was washed with methanol and dried under vacuum for 6.0hrs till get constant weight. Its molar yield is 45 to 59%. The color of the metal complex are light yellow to ash color.

2.4 Instrumental Method:

The melting point of metal complex were recorded by DBK instrument and temperature rise is 2°C per minutes. The IR spectra of complexes were recorded on a Shimadzu FTIR-8400S instrument in KBr pallets in the range of 4000–400 cm⁻¹. The conductance of metal complex solution in DMF was measured in on Aster Conductivity meter (TDS Cl-550). UV-Visible spectra were recorded using DMF as solvent on Shimadzu -1800 UV-VIS spectrophotometer in the range 200–900 nm. TGA analysis of metal complexes were performed out in

nitrogen atmosphere in the range 25–950 °C on Mettler Toledo TG-DTA instrument with a heating rate 10 °C min⁻¹ using Alumina as a working standard.

3. Results & Discussions

All the Zinc metal complexes are stable at ambient temperature. All Zinc complex are insoluble in water as well as commonly used organic solvents. All the complexes are sparingly soluble in DMF & DMSO. As per elemental analysis presented in table - 1 indicates that all the metal complexes are have 1:2 ligand (Metal: ligand) Stoichiometry for all the complexes. The molar conductance values obtained for these complex at the concentration are in the range of 10.12 -15.02 mhos.cm² mol⁻¹ [22] suggesting that non-electrolyte in nature.

3.1 IR Spectral Studies.

Metal complexes reveal that some of the important infrared frequencies which are tabulated in the Table 2. The certain changes between the free ligands and their complexes displayed by IR spectra to give an idea about the type of coordination and their structure. The ligand showed weak broad band around 2939-3086 cm⁻¹ is due to the presence of aromatic hydroxyl group (OH), whereas in the Zn (II) metal complexes this band lacked due to deprotonation forms covalent bond with central atom through oxygen atom. [23]. In this ligand all intense band near 1633-1651cm⁻¹ are related to (C=O) group, this band is turned to lower wave number around 1600-1630 cm⁻¹, this indicates the coordination through oxygen of the (C=O) group. Medium intense band showed in the ligand around 1207-1238cm⁻¹ attributed to (C-O) group, moreover this band is changed to lower wave number around 1188cm⁻¹ which further indicates the coordination through oxygen of (C-O) group[24]. Also the IR spectra of metal complexes exhibits (M-O) band around 400-500 cm⁻¹ and this band is lacking in corresponding ligands.

3.2 Magnetic susceptibility measurement

Magnetic susceptibility studies indicate diamagnetic nature of these complexes and it indicates the d¹⁰ outer electronic configuration of zinc. The present complexes are found to be diamagnetic in nature for the distorted tetrahedral geometry. [25]

3.3 Thermal measurements.

Thermo gravimetric analysis (TGA) was carried out to examine the thermal stability of the six compounds. The crushed single crystal sample was heated up to 950°C in N₂ at a heating rate of 10°C min. The typical TG curves of the all compounds are shown in Fig. 2, respectively.

The TG curves shows that it is stable up to 270°C without any weight loss, which means the compound could retain structural integrity up to 270°C. From 270 to 650°C the total loss of 86 to 89% is consistent with the pyrolysis of organic chemical fragments. The final residue was probably ZnO-remaining weight percentage from 10.10 to 13.0%. Therefore thermal analysis evidence that our findings from IR spectral data metal complex is free of water molecule and it shows metal ligand ratio is 1:2 of Zn (II) complex. (Table. 3).

Finally, the geometric shape of the Zn (II) complexes of 2'-hydroxychalcone is a distorted tetrahedral, it confirmed by analysis magnetic moment, electronic spectral data, IR, and thermal analysis.

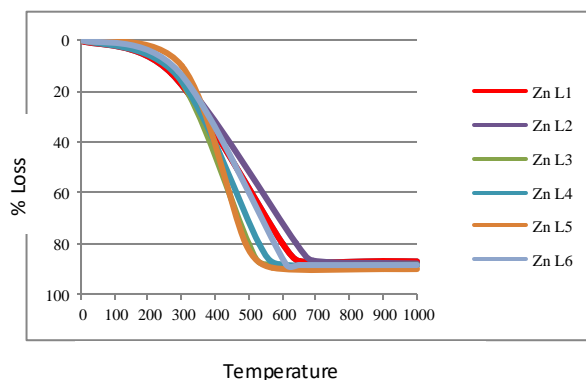


Fig. 2. : Thermogravimetry spectra of Zn (II) complexes.

3.4 Electronic Spectra.

UV spectral study analysis is done by two different methods. In first method 10 ppm solution (Fig: 3A) prepared in acetonitrile (Spectroscopic grade) and in second method (Fig 3B) 1000 ppm solution prepared in N,N-Dimethylformamide (Spectroscopic grade). Because of high cut off wavelength, DMF cannot be used in UV range from 200 nm to 400 nm.

According to Beer Lambert's law, dilute solution (10 ppm) is used but using dilute solution it is impossible to measure the color in visible region. So to overcome this difficulty high concentration (1000 ppm) solution is used (Fig.3B).

The UV-Vis absorption spectra shows the modification of the absorption bands characteristic of the ligand (Fig. 3A), as well as the occurrence of some new bands, characteristic for the formation

of the coordinative compounds. The UV-Vis band observed for ligand exhibits electronic transitions with strong band between 300 to 350 nm was

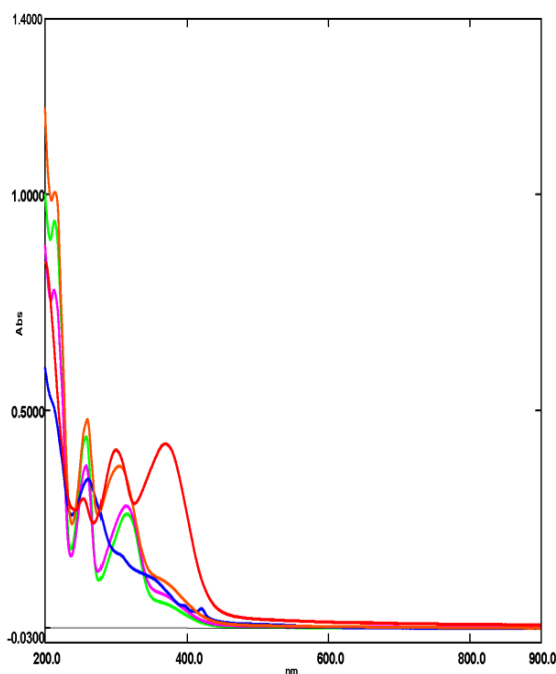


Fig.3A.UV spectra Figure

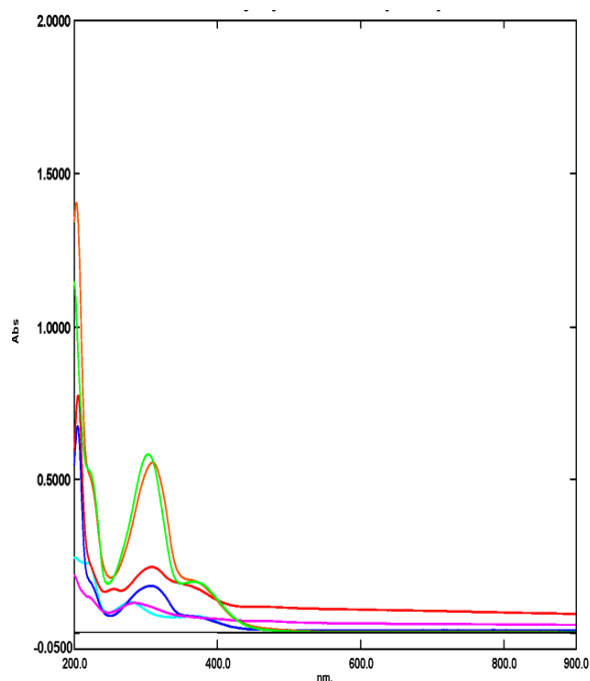


Fig. 3B.UV-Visible

assigned to $\pi-\pi^*$ aromatic group transitions [26, 27, 28] which remains almost unchanged in the complexes. The low intensity band observed at about 315 nm is due to (-CH=CH) Chalcone group and the transition at 345 nm is assigned to $n-\pi^*$ carbonyl group transition. The last intense band observed at 440 nm to 450 nm is probably assigned to $n-\sigma^*$ Spectra Molar absorptivity are calculated for the solution prepared in acetonitrile. Refer table 4 information of Zn (II) chalcone metal complex molar absorptivity. The ZnL1 to ZnL6 molar absorptivity and wavelength differs from the molar absorptivity of ligands.

3.5 NMR.

All the six Zn (II) complexes are diamagnetic nature. These complexes are not soluble in $CDCl_3$. We tried to perform NMR but its resolution is very poor.

3.6 Antibacterial & Antifungal.

The most of the Zn (II) complexes showed biologically activity against various bacterial species as *E.coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* and fungi types like

hydroxyl group of ligand transitions. In the Zinc complexes, these bands experience a bathochromic shift, this displacement is due to the coordination of carbonyl group with metal ions. In Zn (II) complexes a shoulder is observed between 400–600 nm that can be assigned to ligand to metal charge transfer transitions (LMCT) [29].

Aspergillus Niger, *Penecillium crysogenum* and *Candida albicans*. The concentration of the molecules were taken as 0.5 % (5000 μ g/ml) and 1.0 % (10000 μ g/ml) each. The antimicrobial activity was performed by agar plate testing diffusion method. The concentration used for screening was established after estimating the Minimum inhibitory Concentration (MICs) of each compound. The solvent used for dilution was Dimethyl Sulfoxide (DMSO). For Antifungal activity evaluation, Sabouraud Dextrose Agar (SDA) is used as fungal cultures and this was prepared by mixing of Peptone, Dextrose and Agar, distilled water and adjusted the pH to 6.8 then autoclaved the agar media at 121 $^{\circ}$ C for 15 lbs. for 20 minutes. Refer table no.5 & 6.

3.7 Antioxidant

Screening of antioxidant property of synthesized Zn (II) Chalcone metal complexes was measured in terms of hydrogen donating or radical scavenging

ability using the stable radical DPPH. Practically, one Zn (II) metal complex show antioxidant activity.

Determination of antioxidant property with 2, 2’ diphenyl,1-Picrylhydrazyl (DPPH) radical scavenging method.

The antioxidant property of the organic compound was measured in the term of hydrogen donating or radical scavenging ability, using the stable radical DPPH. A methanol stock solution (0.1%) is used to study the antioxidant property. Quantity of stock solution were used as 0.5mL, 1.0 mL, 2.0mL, 3.0mL, 4.0mL, 5.0mL, 6.0mL and 7.0mL in respective 10 mL volumetric flask, to this added 3 mL of 0.1mM solution of DPPH and dilute to 10 mL with Methanol. Shaken well to mix and incubated in the dark for about 30 minutes at room temperature.

The incubated solutions were measured at 517 nm immediately using UV-visible spectrophotometer. DPPH solution appears a deep violet color. The absorption vanishes and the resulting decolourisation is stoichiometric with respect to degree of reduction. The remaining DPPH, measured after a certain time corresponds inversely to the radical scavenging activity of the antioxidant (Blois.1958).The decrease in absorbance at 517 nm was determined by UV-Visible spectrometer (Make: Shimadzu; Model 1800). Quartz cuvette was used of 1cm path length. Methanol i.e. diluent was used as blank solution and the absorbance of DPPH solution without antioxidant i.e. sample solution is used as control solution.

The percentages inhibition of the DPDPH radical by the samples was calculated accordingly to the formula of Yen and Duh.

$$\% \text{ inhibition} = \frac{(A_{C(o)} - A_{A(T)})}{A_{C(o)}} \times 100$$

Where;

$A_{C(o)}$ is the absorbance of the control at $t = 0$ min and $A_{A(T)}$ is the absorbance of the antioxidant at $t = \frac{1}{2}$ an hour.

The EC50 value represents the concentration of extract that gives rise to 50% reduction in DPPH absorbance, and to be measured by linear regression curve analysis.

Systemic Diagram of UV-Visible spectrum of 0.004% DPPH solution (Violet colored spectra) and reduced spectra after addition of sample solution (Yellow spectra).Refer- Fig : 4. Refer Table: 7 for of Metal complex EC50 Value. The % Inhibition & EC50 value of Zn L5 mentioned. Refer Table: 8.

Above curve (ZnL5)-Fig: 5, represents Y-axis is % inhibition of Zn complex and on X-axis, sample concentration in mg with respect to degree of reduction. 0.004% DPPH gives 0.520 absorbance. The absorbance is decreased after increase of sample concentration as shown in above Table no.8.

As the properties curve is linear to the concentration range from 0.5 mg to 7.0 mg. The antioxidant property is calculated with respect to the equation of line i.e. $y = mX + C$; where m =Slope , C = intercept and $y = EC50$ value represents the concentration of extract that gives rise to 50% reduction in DPPH absorbance, and to be measured by linear regression curve analysis. In the above curve $y = 6.2253 + 21.96$ is the equation of linear regression curve and $R^2=0.9946$ represents the linear regression.

By the line of equation $EC50 = 4.50$ mg
 Experimental conditions for Ascorbic acid checked simultaneously for system and method suitability and it is found OK as per earlier reported method.

3.8 In vitro Cytotoxicity Study (Anti-cancer)

In vitro anticancer activities of all synthesized Zn (II) Chalcone metal complexes were evaluated by using DLA (Dalton’s lymphoma ascites cells) by using mice tumor cells [26]. In this method target molecule are studied in various concentration from 10µg/mL to 200µg/mL. Based on the analytical finding data reveals that most of Zn (II) Chalcone metal complexes are active. Refer Table no.9 (DLA method).

Table: 1 .: Physical and Analytical Data of metal complexes.

Com plex	Empirical Formula	Mol.wt	Yield	% Elemental Analysis Found (Calculated)					N	Molar conductance Mhos.cm ² mol ⁻¹
				M	C	H	O	F or Br		
Zn L1	C ₃₄ H ₂₈ ZnF ₂ O ₄	603.99	59	10.85 (10.83)	67.75 (67.61)	4.62 (4.67)	10.57 (10.60)	6.21 (6.29)	-	12.03
Zn L2	C ₃₄ H ₂₈ ZnF ₂ O ₄	603.99	57	10.80 (10.83)	67.79 (67.61)	4.61 (4.67)	10.55 (10.60)	6.25 (6.29)	-	12.07
Zn L3	C ₃₄ H ₂₈ ZnN ₂ O ₈	658.0	45	9.89 (9.94)	62.12 (62.06)	4.16 (4.29)	19.55 (19.45)	-	4.28 (4.26)	11.97
Zn L4	C ₃₆ H ₂₈ ZnF ₆ O ₄	704.0	57	9.21 (9.29)	61.53 (61.42)	3.97 (4.01)	9.05 (9.09)	16.24 (16.19)	-	13.52
Zn L5	C ₃₄ H ₂₈ Zn Br ₂ O ₆	757.78	59	8.60 (8.63)	53.92 (53.89)	3.77 (3.72)	12.60 (12.67)	21.11 (21.09)	-	15.02
Zn L6	C ₄₂ H ₃₄ ZnO ₄	668.12	48	9.82 (9.79)	75.54 (75.50)	5.10 (5.13)	9.54 (9.58)	-	-	10.12

Table-2: Important IR spectra bands (cm⁻¹) of the complexes.

Compound	OH group	C=O	C=C	C-O	M-O	C-F	C-NO ₂	C-F ₃	C-Br
L1	3050	1643	1500	1228	-	1274	-	-	-
Zn L1	-	1618	1570	1188	445	1257	-	-	-
L2	2939	1649	1583	1228	-	1278	-	-	-
Zn L2	-	1618	1566	1193	488	1257	-	-	-
L3	3086	1651	1573	1217	-	-	1359	-	-
Zn L3	-	1620	1529	1188	475	-	1348	-	-
L4	2976	1643	1571	1211	-	-	-	1286	-
Zn L4	-	1625	1583	1190	488	-	-	1288	-
L5	2972	1633	1566	1207	-	-	-	-	551
Zn L5	-	1600	1556	1190	462	-	-	-	448
L6	3043	1645	1568	1238	-	-	-	-	-
Zn L6	-	1630	1541	1191	470	-	-	-	-

Table 3: Thermal data of Zinc metal complex.

Complex	Temperature range	% weight loss		Decomposition Product
		Found	Calculated	
Zn L1	270-650	87.0	86.87	C ₃₄ H ₂₈ F ₂ O ₄ ZnO
	651-900	13.0	13.13	
Zn L2	280-600	87.31	86.87	C ₃₄ H ₂₈ F ₂ O ₄ ZnO
	601-900	12.70	13.13	
Zn L3	276-550	88.0	87.93	C ₃₄ H ₂₈ N ₂ O ₈ ZnO
	551-900	12.0	12.07	
Zn L4	286-590	88.10	88.70	C ₃₆ H ₂₈ F ₆ O ₄ ZnO
	591-900	11.90	11.30	
Zn L5	300-580	90.0	89.48	C ₃₄ H ₂₈ Br ₂ O ₆ ZnO
	581-900	10.10	10.52	
Zn L6	290-650	87.8	88.10	C ₄₂ H ₃₄ O ₄ ZnO
	651-900	12.20	11.90	

Table 4. UV spectrum of complex λ max and molar absorptivity.

UV-Visible spectrophotometric analysis of chalcone complexes. Following table indicates absorbance's, lambda maximum and their respective molar absorptive values.

Complex	λ nm	Absorbance 1	λ 2 Nm	Absorbance-2	Molar absorptivity-1 (L mol ⁻¹ cm ⁻¹)	Molar absorptivity-2 (L mol ⁻¹ cm ⁻¹)
Zn L1	314	0.2813	256.5	0.3687	8495	11135
Zn L2	315.1	0.2628	258	0.4404	8354	14000
Zn L3	259	0.3417	ND	Shoulder peak	11834	NA
Zn L4	303.5	0.3729	260.5	0.4802	13126	16903
Zn L5	370.5	0.4237	302	0.4078	16899	16265
Zn L6	315.1	0.2630	259	0.5900	11953	26815

Table-5: Antibacterial activity of Zn (II) Chalcone Metal Complexes.

Compound Name	Compound Code	Escherichia Coli (NCIM 2685)		Pseudomonas aeruginosa (ATCC 27853)		Staphylococcus aureus (ATCC 25923)	
		1 % sample dilution	0.5% sample dilution	1 % sample dilution	0.5% sample dilution	1 % sample dilution	0.5% sample dilution
		Zone of inhibition in mm		Zone of inhibition in mm		Zone of inhibition in mm	
Zn(II) 2-Fluro Chalcone	Zn L1	20	18	27	17	23	17
Zn(II) 3-Fluro Chalcone	Zn L2	20	20	22	19	20	18
Zn(II) 3-Nitro Chalcone	Zn L3	22	22	22	19	27	22
Zn(II) 2-TFM Chalcone	Zn L4	23	16	22	18	19	10
Zn(II) 5-Bromo Salicylaldehyde Chalcone	Zn L5	22	20	23	17	22	11
Zn(II) 1-Naphthyl Chalcone	Zn L6	15	10	NZ	NZ	6	NZ
Chloramphenicol	Standard	20		20		20	

Table-6: Antifungal Activity of Zn (II) Chalcone Metal Complexes

Compound Name	Compound Code	Aspergillus Niger (ATCC: 16838)		Penicilium crysogenum (ATCC: 10106)		Candida albicans (ATCC: 18804)	
		1 % sample dilution	0.5% sample dilution	1 % sample dilution	0.5% sample dilution	1 % sample dilution	0.5% sample dilution
		Zone of inhibition in mm		Zone of inhibition in mm		Zone of inhibition in mm	
Zn(II) 2-Fluro Chalcone	Zn L1	18	12	22	19	23	17
Zn(II) 3-Fluro Chalcone	Zn L2	20	10	22	19	22	20
Zn(II) 3-Nitro Chalcone	Zn L3	19	10	19	19	23	18
Zn(II) 2-TFM Chalcone	Zn L4	22	10	23	22	23	20
Zn(II) 5-Bromo Salicylaldehyde Chalcone	Zn L5	20	10	22	19	22	20
Zn(II) 1-Naphthyl Chalcone	Zn L6	10	06	NZ	NZ	16	10
Fluconazole	Standard	19		19		19	

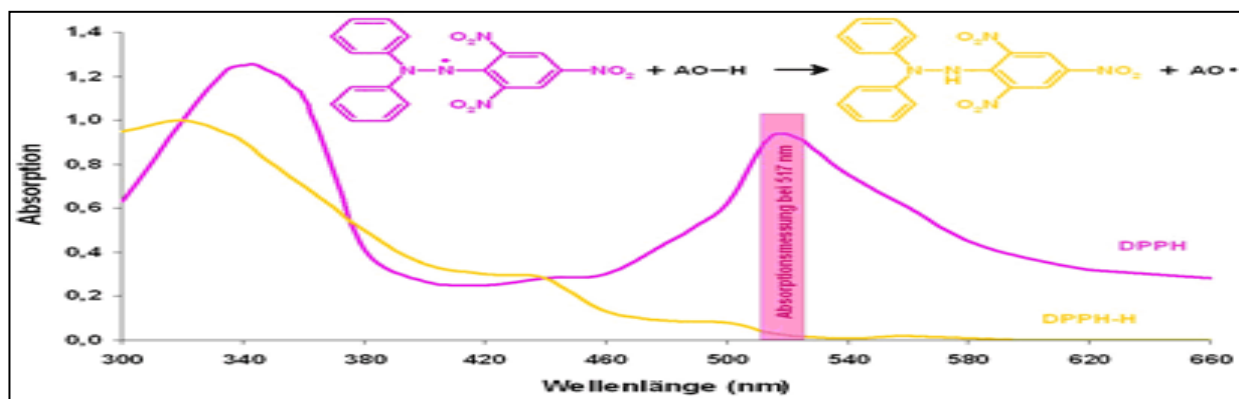

Fig-4: UV-Visible spectrum of DPPH solution and reduced spectra of Zn (II) metal complex.

Table-7: Zn (II) Chalcone metal complex were studied for antioxidant property

B. No.	Chalcone Name	EC ₅₀ value
Zn L1	2'-Hydroxy-4',5'-dimethyl-2-fluoro Chalcone, ZN Complex	-
Zn L2	2'-Hydroxy-4',5'-dimethyl-3-fluoro Chalcone, ZN Complex	-
Zn L3	2'-Hydroxy-4',5'-dimethyl-3-Nitro Chalcone, ZN Complex	-
Zn L4	2'-Hydroxy-4',5'-dimethyl-trifluoro methoxy Chalcone, ZN Complex	-
Zn L5	2'-Hydroxy-4',5'-dimethyl-Br salicylaldehyde Chalcone, ZN Complex	4.50mg
Zn L6	2'-Hydroxy-4',5'-dimethyl-NAPHC Chalcone, ZN Complex	-
-	Ascorbic acid for reference	0.0185 mg

Table-8: % Inhibition & EC50 value of Zn L5

Concentration of sample in mg	Absorbance ($A_{A(T)}$)	% inhibition of Zn L5 Complex
0.500	0.500	24.14
1.000	0.420	27.59
2.000	0.380	34.38
3.000	0.340	41.38
4.000	0.298	48.62
5.000	0.270	53.45
6.000	0.234	59.66
7.000	0.210	63.79
$A_{C(o)} - >$	0.520	

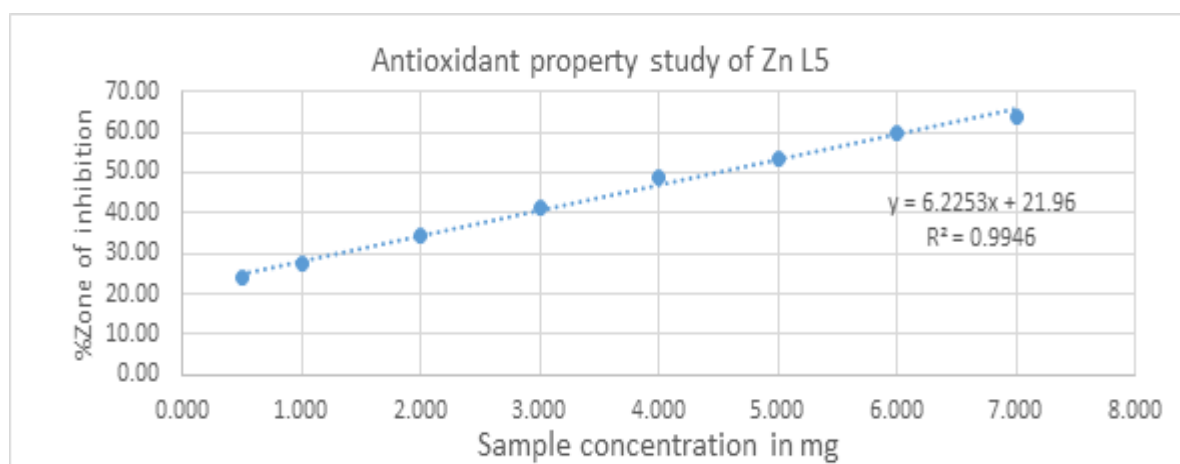
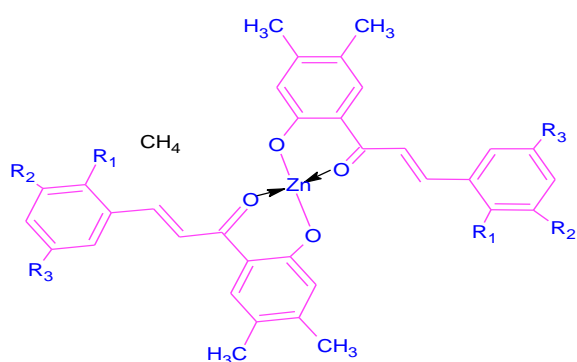
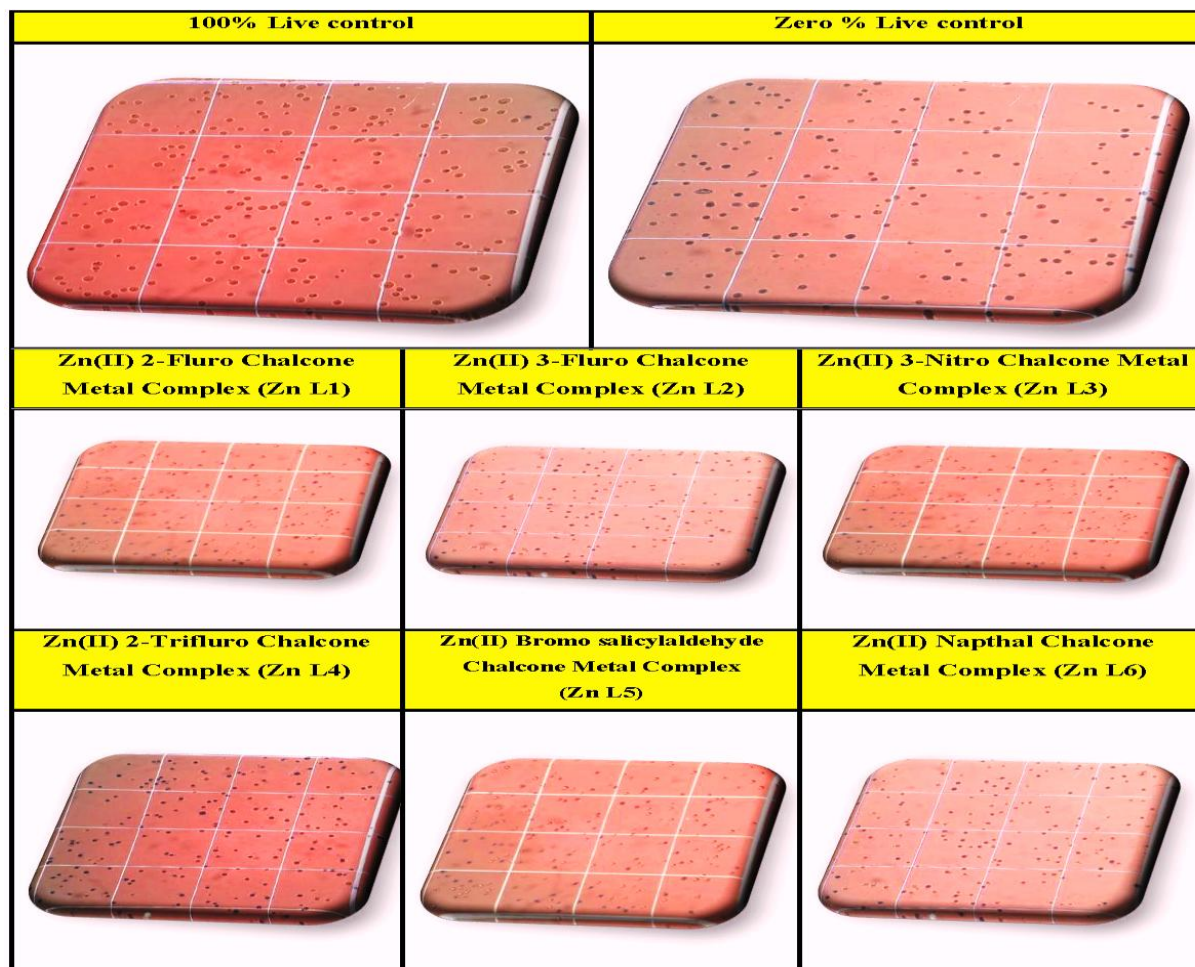


Fig-5: Antioxidant study graph of Zn L5

Table -9: .In vitro cytotoxicity by DLA method.

Concentration of complex $\mu\text{g/mL}$	Name of Zn (II) complex & Percentage cell death.					
	Zn L1	Zn L2	Zn L3	Zn L4	Zn L5	Zn L6
200	62.90%	69.80%	59.10%	90.10%	55.20%	69.20%
100	51.40%	54.70%	42.30%	83.30%	50.91%	45.60%
50	40.30%	35.80%	33.60%	76.10%	40.00%	35.10%
20	26.60%	28.30%	21.10%	64.70%	28.50%	23.10%
10	14.20%	20.70%	09.60%	49.50%	21.40%	11.10%

Fig-6: Images of Invitro cytotoxicity by DLA method



Zn L1: R1 =F, R2=H, R3=H; Zn L2: R1 =H, R2=F, R3=H;
 Zn L3: R1 =H, R2=NO2, R3=H; Zn L4: R1 =CF3, R2=H, R3=H;
 Zn L5:R1 =OH, R2=H, R3=Br; Zn L6:R1 & R2=Phenyl ring attached R3=H

Fig-7: Proposed structure of Zn (II) Chalcone metal complex.

4. Conclusion:

Based on the result conclusion is as follows. The Zn (II) Chalcone metal complex derivatives are colored. These are all insoluble in water and most of organic solvents and sparingly soluble in DMF & DMSO. The Stoichiometry of the metal complexes synthesized has been found to be 1:2 of metal with Ligand. The presence of strong metal –ligand bonding and non-electrolytic nature of complexes is confirmed by decomposition study of TGA and electrical conductance studies respectively. Also magnetic study tells that all the complexes are diamagnetic nature. The bonding of the metal through O donor atoms of the Chalcone is proved by IR Spectrum. Based on the biological study most of Zn (II) complex chalcone shows good antibacterial, antifungal, & anticancer. One metal complex shows anti-oxidant property.

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