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The Enfluence of New Organo-Palladium Compounds and Their Silver Nanoparticle Forms as Potential Highly Antimicrobial

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***Abstract*—2-(2-oxo-2H-pyrano[3,2-h]quinolin-4-yl) acetic acid (1a) and 4-(2,2- dihydroxy-vinyl)-2H-pyrano[3,2-h]quinolin-2-one (1b) were obtained from the reaction of 8-hydroxyquinoline with acetone dicarboxylic acid. New products (2a) & (2b) were inferred from the reaction of compounds (1a)& (1b) with N-(2-amino ethyl)propane-1,3-diamine. New palladated products (3&4) were obtained from the reactions of palladium (II) with (1a) and (1b), also metallated products (5) was formed from the reactions with (2a) & (2b). Elucidation of the structures based on their elemental analyses, IR, 1HNMR, and MS. The silver nanoparticle forms of the products were prepared and the antimicrobial activities of the all products and their silver nanoparticle forms were examined. The anticancer activity of the selected compound (5) was screened and found to exhibit anticancer activity.**

***Keywords*—Hydroxyquinoline, Pyranoquinoline, Organopalladium compounds, Metallation, Antimicrobial, Silvernano compounds, Anticancer.**

I. INTRODUCTION

Quinolines were reported to show considerable importance for their pharmacological properties like antimicrobial [1-5], antimalarial [6], anti-inflammatory [7,8],Antitumor [9,10], antioxidant [11], and antiplatelet activity [12]. Pyranoquinoline also showed antimicrobial activities [13], many derivatives of this heterocyclic compounds are biologically active and were found to be useful intermediates for many medicinal products [14,15]. It was found that pyranoquinoline derivatives containing pyrazole and indoline moieties have excellent antibacterial and antifungal activities [16]. Schiff base 2-(4-methoxybenzylidene amino) benzene-thiol, its metallation with mercury(II), nickel(II), palladium(II), and phosphorylation gave compounds exhibited antimicrobial and anticancer activity [17]. Organopalladium and organomercury compounds via metallation of some new Schiff bases were also synthesized [18,19]. Screening of organopalladium of the acetone Schiff bases of S-methyl-and S- benzyldithiocarbazate compounds for their cytotoxicities against T-lymphoblastic leukemia cancer cells shows that they exhibit strong cytotoxicities against this cancer; their activities being more than that of the standard anticancer drug tamoxifen [20]. Biological studies of some palladium(II) and platinum(II) compounds derived from biologically active sulfur donor ligands 1-H-indol-2,3-dione benzothiazoline and 5-nitro-1-H-indol-2,3-dione benzothiazoline have been noted that the growth-inhibiting potential of the compounds is greater than the parent benzothiazolines toward a variety of fungal and bacterial strains [21].The preparation of endo-cyclic six-membered cyclopalladated compound with a metallated benzylic carbon atom has been reported [22,23]. The cyclopalladation of mesogenic Schiff bases and subsequent reaction with natural L-amino acids to yield a novel series of metallomesogenes were discussed [24-27]. Cyclopalladation reaction in acetic acid of benzylbenzylidene-amine $PhCHNCH_2Ph$ with palladium acetate gives acetato-bridged endo-cyclopalladate dimer [28].

In continuation to our previous work we synthesized some new organic compounds and their Schiff bases followed by metallation and evaluation of the new compounds and their nanoparticle forms as antimicrobial and selection of compounds in order to screen the anticancer activity.

II. EASE OF USE

Melting points were measured by a Gallen Kamp melting point apparatus. Thin layer chromatography was performed with fluorescent silica gel plates HF254 (Merck), and plates were viewed under UV light at 254 and 265 nm. The elemental analyses were determined by a Perkin-Elmer Analyzer 2440. Infrared spectra (√ cm-1) were recorded on Bruker Vector Germany and on Mattson FT-IR 1000, using KBr disks. Mass spectra were measured on GCQ Finnigan MAT in Micro Analytical Center, Cairo University, Giza, Egypt. 1H-NMR spectra were recorded on Gemini 200 MHZ NMR spectrometer, in DMSO-d6 solution with TMS as internal standard in was determined in microanalytical center in main defense chemical laboratory of the Egyptian Accreditation council. The antibacterial activity was determined in microanalytical center in main defense chemical laboratory of the Egyptian Accreditation council. The anticancer activity was checked in the National Cancer Institute, Cancer biology department, Pharmacology, Cairo University, Egypt. Transmission electron microscopy (TEM) images were taken on (JEOL; model 1200 EX) at an accelerator voltage of 80 Kv, Central lab., Ain Shams University.

The Preparation of compounds 2-(2-oxo-2H-pyrano[3,2-h]quinolin-4-yl)acetic acid (1a), and 4-(2,2-dihydroxyvinyl)-2H-pyrano[3,2- h]- quinolin-2-one (1b).

2-(2-oxo-2H-pyrano[3,2-h]quinolin-4-yl)acetic acid (1a)

The phenol of 8-hydroxy qunioline with (1g, 10 mmol was dissolved in 70% sulfuric acid (10 ml) at 0oC, 1,3-acetone dicarboxylic acid (19,10 mmol) was added in few portions. The mixture was allowed to warm up at temperature (> 25o c) and stirred further for 4 hours. The resulting solution was poured onto crushed ice then left in refrigerator for about two days. They formed white needles were collected by filtration and dried well under reduced pressure to afford (1a) as white product m.p. 190-191 oc, The IR spectrum for compound (1a) showed νOH at 3333 cm-1, νCHstr. at 2936 cm-1 , νC=O at 1718 cm-1, νC=N at 1597 cm-1 , νC-H bending at 1402 cm-1. The MS spectrum showed the molecular ion peak at $\overline{M}^{+\bullet}$ at 255(14.5%) and the base peak at 80(100%) can be attributed to $C_5H_6N^{+}$. 4-(2, 2-dihydroxyvinyl)-2H- pyrano[3,2- h]-quinolin-2-one (1b)[29]

The same procedure as above, but the mixture was allowed to reach temperature (< 25 oc) and stirred further for 4 hours. The resulting solution was poured onto crushed ice then left in refrigerator for about two days. The formed yellow needles were collected by filtration and dried well under reduced pressure to afford (1b) as yellow needles in 80% yield; mp: 95oC, IR (KBr) (cm-1): 3505 (OH, carboxylic acid), 3402 (OH, enol form), 3077 (CH, aromatic), ν ArC-H at 3077 cm-1, νC=c-H at 3014 cm-1,νC=O at 1723 cm-1 (lactone), νC=N at 1596 cm-1 .MS (m/z%), 256 ($M+1^{+}$, 11.36%), 69 (100%); 1H-NMR (DMSO-d6) δ: 2.08 (2H, CH2), 6.24 (1H, CO-CH=), 7.46, 8.05 (5H, CH Ar), 9.10 (H, OH); 13C-NMR (100 MHZ, DMSO); δ: 38.6, 115.8, 118.5, 122.2, 122.4, 129.0, 129.7, 130.3, 130.4, 144.3, 144.5, 146.0, 146.1, 148

Synthesis of compounds (2a) & (2b).

General Procedure:

In ethyl alcohol a mixture of (1a)or (1b) (1 mmol) and (1 mmol) N-(2-amino ethyl) propane-1,3-diamine in 50 mL of ethyl alcohol is refluxed for 3 h. The reaction mixture left to cool and the precipitate, filtered, dried, and crystallized from the suitable solvent.

Metallation of compound (1a),(1b)& (2b) with palladium chloride

General Procedure:

Palladium chloride (1mmol) reacted with (1a), (1b) & (2b) (1mmol) in methanol with the addition of 1 ml of hydrochloric acid, the reaction mixture was refluxed for 4 h. The precipitated product was filtered off, dried, and crystallized from the suitable solvent.

Metallation of compound (1a), (1b) & (2b) with cobalt acetate and copper acetate

General Procedure:

The metal acetate (1mmol) reacts with (1a) or (1b)& or(2b) (1mmol) in 50 mL of toluene in the presence of few drops of acetic acid under reflux for 3 h. The precipitated crystals are filtered, dried, and crystallized from acetic acid. Compound (2a): Green crystals, (yield: 70%), m.p. 95oC. IR (KBr) (cm-1): The IR spectrum of compound (2a) showed νNH (forCONH) at 3494 cm-1&3417cm-1, νNH (for –CH2-NH-CH2-) at 3329 cm-1, νNH(attached to the ring) at 3157 cm-1 (due to hydrogen bonding), νArC-H at 3060, , νCHstr at 2 951, νC=O at 1659 , νC=C alkene at 1618 , νC-H bending at 1465. The 1HNMR showed δ 9.15-6.98 ppm (5 H, Ar.protons), δ 8.8 ppm (1H,CONH proton), δ 6.68 ppm(1H, =CH-), δ3.66ppm (6H, =C-H,2CH2,2NH), δ 2.42,2.12 ppm (2CH2 and CH2). The MS spectrum showed $M+1^{+}$ at m/z 337(0.66%) and the base peak at m/z 79.95(100%) which can be attributed to $C_5H_6N^{+}$.

Compound (2b): Yellow crystals, (yield: 75%), m.p.164-165oC, IR (KBr) (cm-1): showed νOH at 3358, νNH at 3345, νNH(attached to the ring) at 3159 cm-1 (due to hydrogen bonding), νArC-H at 3061 , νCHstr at 2962, νC=N at 1635, νC-H bending at 1428. The 1HNMR spectrum showed δ 9.15-6.9 ppm (5 H, Ar.protons, -C=C-H), δ 6.71ppm (1H,C=C-H proton), δ 4.9 ppm(8H, =CH-, 2NH,OH,2CH2), δ 2.4, 2.13,1.8 ppm (3CH2 protons). The MS spectrum for showed $M+2^{+}$ at m/z 338(0.37%) and the base peak at m/z 69(100%) due to $C_4H_7N^{+}$.

Compound (3):Pale yellow crystals, (yield: 80%), m.p.309-310oC, IR (KBr) (cm-1): showed two νOH at 3506& 3398 cm-1, νArC-H at 3103 cm-1, ν =CHstr at 3079 cm-1 , νC=O at 1626 cm-1 and νPd-c at 497 cm-1. 1 HNMR for showed δ 11.86 ppm(1H,for OH), δ 9.74 ppm(1H,for conjugated OH), δ 9.47- 7.3 ppm (5H, for aromatic protons) and δ7.2 ppm (1H, for methine proton). The MS spectrum showed $M+1^{+}$ at m/z 396(29.20%) and the base peak at m/z 77(100%) for $C_6H_5^{+}$.

Compound (4): Pale brown crystals, (yield: 81 %), m.p.240-241 oC, IR (KBr) (cm-1): showed νOH at 3339 cm-1, νArC-Hat 3100 cm-1, ν CH2 at 2950 cm-1,lactone νC=O at 1750 cm-1, νC=O at 1630 cm-1and νPd-c at 488 cm-1. 1 HNMR for showed δ 11.70 ppm(1H,for OH), δ 9.07- 7.3 ppm (5H, for aromatic protons) and δ7.2 ppm (1H, for methine proton). The MS spectrum showed $M+1^{+}$ at m/z 396(5.75%) and the base peak at m/z 116 (100%) due to $C_8H_6N^{+}$.

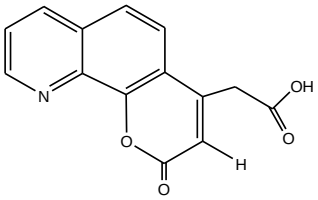
Compound (5): Pale brown crystals, (yield: 73 %), m.p.d.340 oC, IR (KBr) (cm-1 Showed νOH at 3448 cm-1, νNH at 3121 cm-1, νCHstr at 2934 cm-1, νC-H bending at 1398 cm-1 , νC-pd at 490 cm-1. The 1HNMR spectrum showed δ 9.6-7.2 ppm(5 H, Ar.protons,), δ6.82 ppm (1H, for =CH-), δ 2.49,2.32,2.19, 1.96,1.23 ppm(10H,for 5 CH2), δ2.0 ppm (3H for OH,2 NH). The disappearance of δ 4.90 ppm with respect to the parent indicated that substitution took place at that position via coordination with nitrogen followed by electrophilic substitution . The MS spectrum for compound showed $M+1^{+}$ at m/z 478(9.67).The base peak at m/z 57(100%) can be attribute to $CH_2{=}CH{-}CH_2{-}NH_2^{+\bullet}$

III. RESULTS AND DISCUSSION

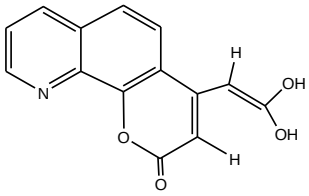
In our previous work 4-(2,2-dihydroxyvinyl)-2H-pyrano[3,2-h]quinolin-2-one was prepared [29] without isolation of its isomer. Here we obtained the two isomers as they depend on the reaction temperature and confirmed their structures.

Synthesis of compounds (1a) & (1b).

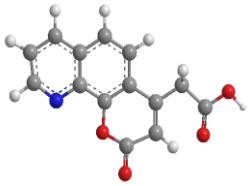
White product (1a) 2-(2-oxo-2H-pyrano [3,2-h]quinolin-4-yl)acetic acid was prepared via the reaction of 8-hydroxyquinoline with acetone dicarboxylic acid in presence of sulphuric acid at 25°c or above. The formed new product depends on the temperature, while yellow product (1b) 4-(2,2-dihydroxyvinyl)-2H-pyrano[3,2-h]quinolin-2-one was formed with the same reaction but at less than 25°c .The suggested structures were considered to be as follows:



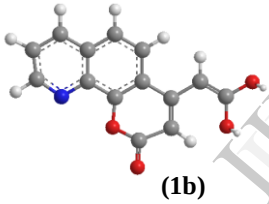
(1a)



(1b)

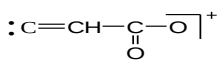


(1a)

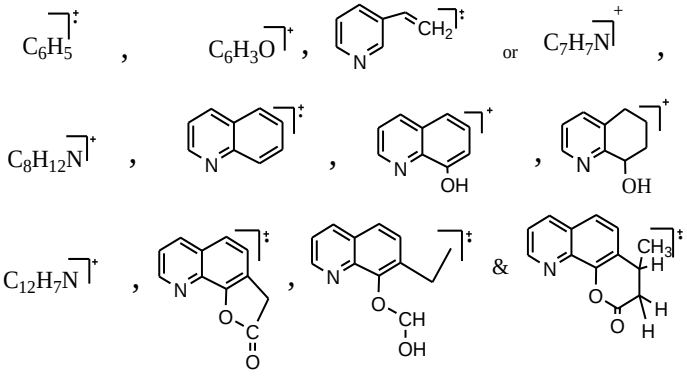


(1b)

The characterization of the structures using IR , MS and elemental analysis. The IR spectrum for compound (1a) showed νOH at 3333 cm-1, νCHstr. at 2936 cm-1 , νC=O at 1718 cm-1, νC=N at 1597 cm-1 , νC-H bending at 1402 cm-1.The IR spectrum for compound (1b) showed νOH at 3505 cm-1, at 3402 cm-1, ν ArC-H at 3077 cm-1, νC=c-H at 3014 cm-1 νC=O at 1723 cm-1, νC=N at 1596 cm-1 . The MS spectrum for compound (1a) showed the molecular ion peak at $\overline{\text{M}}^{+\bullet}$ at 255(14.5%) and the base peak at 80(100%) can be attributed to C5H6N $\overline{}^{+}$ .The MS spectrum for compound (1b) showed at $\overline{\text{M+1}}^{+}$ 256(11.36%) and the base peak at 69(100%) due to



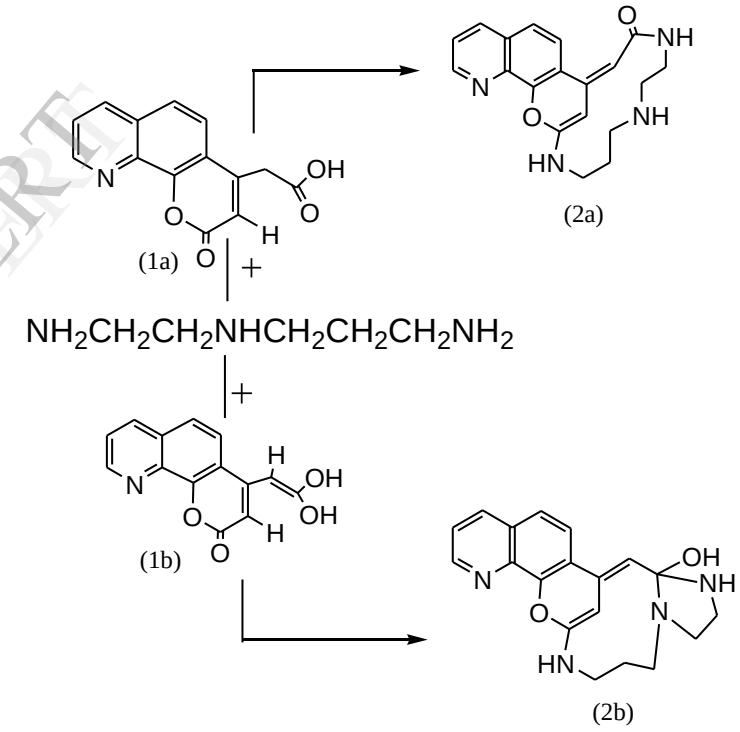
The intense peaks at m/z, s 77(48.32%), 91 (38.25%), 105(54.15%), 122(36.31%), 129(27.36 %), 145(29.81%), 149(69.6%), 165(25.68%), 185 (24.53 %), 202 (25.82%) & 213 (14.85%). can be attributed to



1H-NMR (DMSO-d6) δ: 2.08 (2H, CH2), 6.24 (1H, CO-CH=), 7.48, 8.05 (5H, CH Ar), 9.10 (H, OH); 13C-NMR (100 MHZ, DMSO); δ: 38.6, 115.8, 118.5, 122.2, 122.4,129.0, 129.7, 130.3, 130.4, 144.3, 144.5,

Synthesis of compounds (2a) & (2b).

Schiff bases (2a) & (2b) were inferred from the reaction of compounds (1a) or (1b) with N-(2-amino ethyl) propane-1,3-diamine Scheme (1). . .



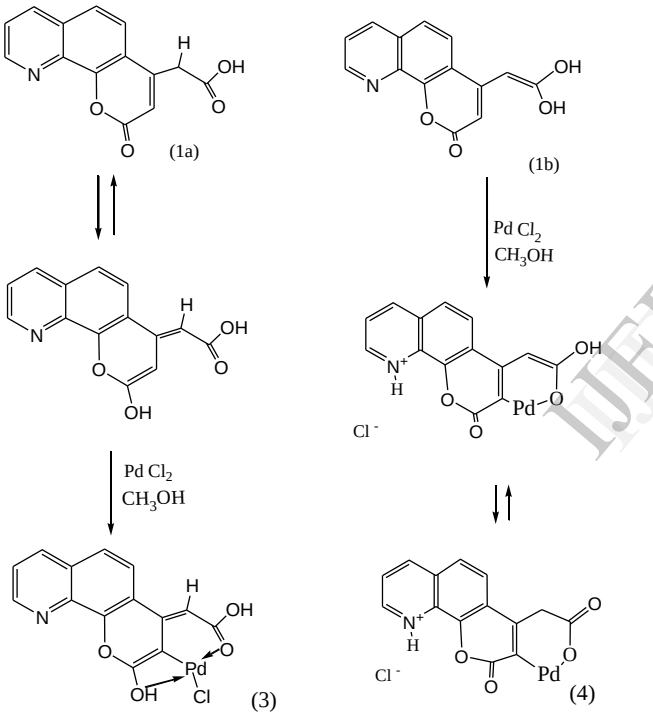
Scheme (1).

Elucidation of the structures based on IR,1HNMR , MS and elemental analyses. The IR spectrum of compound (2a) showed νNH (for CONH) at 3494cm-1 &3417cm-1, νNH (for –CH_2-NH-CH_2-) at 3329 cm-1, νNH(attached to the ring) at 3157 cm-1 (due to hydrogen bonding), νArC-H at 3060 cm-1 , νCHstr at 2951 cm-1 , νC=O at 1659 cm-1, νC=C alkene at 1618 cm-1 , νC-H bending at 1465 cm-1. The 1HNMR showed δ 9.15-6.98 ppm (5 H, Ar.protons), δ 8.8 ppm (1H,CONH proton), δ 6.68 ppm(1H, =CH-), δ3.66ppm (6H, =C-H,2CH_2,2NH), δ 2.42,2.12 ppm (2CH_2 and CH_2). The MS

spectrum showed M+1 ⁺ at m/z 337(0.66%) and the base peak at m/z 69(100%) which can be attributed to C4H7N ⁺. . The IR for compound (2b) showed νOH at 3358 cm-1, νNH at 3345 cm-1 , νArC-H at 3061 cm-1, , νCHstr at 2962 cm-1 , νC=N at 1635 cm-1, νC-H bending at 1428 cm-1 . The 1HNMR spectrum showed δ 9.15-6.9 ppm (5 H, Ar.protons, -C=C-H), δ 6.71 ppm (1H,C=C-H proton), δ 4.9 ppm(8H, =CH-, 2NH,OH,2CH2), δ 2.4, 2.13,1.8 ppm (3CH2 protons). The MS spectrum for compound (2b) showed M+2 ⁺ at m/z 338(0.37%) and the base peak at m/z 79.95 (100%) due to C5H6N ⁺

Action of palladium chloride on compound (1a)& (1b):

The reaction of compounds (Ia) and (Ib) with palladium chloride gave rise to new compounds (3) and (4) via coordination with the oxygen followed by electrophilic substitution cf. scheme (3)



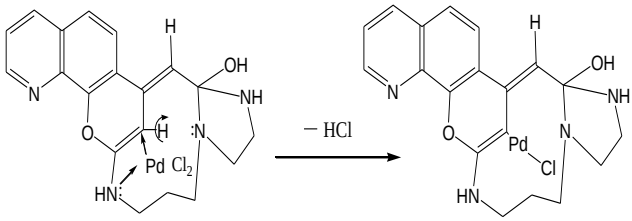
Scheme (3)

The structures were confirmed on the bases of their elemental analyses, IR, 1 NMR and MS spectra. The IR spectra for compounds(3) and (4) showed difference, where compound (3) showed two νOH at 3506& 3398 cm-1, νArC-Hat 3103 cm-1, ν =CHstr at 3079 cm-1 , νC=O at 1626 cm-1and νPd-c at 497 cm-1,while compound (4) showed νOH at 3339 cm-1, νArC-Hat 3100 cm-1, ν CH2 at 2950 cm-1, lactone νC=O at 1750 cm-1, νC=O at 1630 cm-1and νPd-c at 488 cm-1. 1 HNMR for compound (3) showed δ 11.86 ppm(1H,for OH), δ 9.74 ppm(1H,for conjugated OH), δ 9.47- 7.3 ppm (5H, for aromatic protons) and δ7.2 ppm (1H, for methine proton). Compound (4) showed δ 11.70 ppm(1H,for OH), δ 9.07- 7.3

ppm (5H, for aromatic protons) and δ7.2 ppm (1H, for methine proton). The MS spectrum for compound (3) showed M+1 ⁺ at m/z 396(29.20%) and the base peak at m/z 77(100%) due to C6H5 ⁺. The MS spectrum for compound (4) showed M+1 ⁺ at m/z 396(5.75%) and the base peak at m/z 116(100%) due to C8H6N ⁺

Action of palladium chloride on compounds (2a) & (2b).

Metallation of compounds (2a) &(2b) using palladium chloride afforded new compound (5).



(5)

Spectral data confirmed the structure. The IR spectrum showed νOH at 3448 cm^{-1}, νNH at 3121 cm^{-1}, νCHstr at 2934 cm^{-1}, νC-H bending at 1398 cm^{-1} , νC-pd at 490 cm^{-1}. The 1HNMR spectrum showed δ 9.6-7.2 ppm(5 H, Ar.protons,), δ6.82 ppm (1H, for =CH-), δ 2.49,2.32,2.19, 1.96,1.23 ppm(10H,for 5 CH2), δ2.0 ppm (3H for OH,2 NH). The disappearance of δ 4.90 ppm with respect to the parent indicated that substitution took place at that position via coordination with nitrogen followed by electrophilic substitution. The MS spectrum for compound showed M+1 ⁺ at m/z 478(9.67).The base peak at m/z 57(100%) can be attributed to CH_2=CH-CH_2-NH_2 ⁺·

IV. BIOLOGICAL ACTIVITY

Measurement of Antimicrobial Activity using Diffusion disc Method: A filter paper sterilized disc saturated with measured quantity of the sample is placed on a plate containing solid bacterial medium (nutrient agar broth) or fungal medium (Doxs medium) which has been heavily seeded with the spore suspension of the tested organism. After incubation, the diameter of the clear zone of inhibition surrounding the sample is taken as a measure of the inhibitory power of the sample against the particular test organism [30-34]. The antimicrobial activity of all compounds were tested and the results showed that compound (1a,1b) exhibited strong activities towards bacteria and fungi. Compound (3) had no activity and (2a),(2b),(5) exhibited moderate activity towards staphylococcus aureus (G+).Compounds (2a),(2b), (3) ,(5) showed moderate activities towards escherichia coli (G-), compounds(2a,2b,3,5)showed moderate activities towards Candida albicans and Aspergillus Niger.The results showed also that compounds(1a, 1b, 4) exhibited high activities. The antibacterial and antifungal activities of the silver nano forms(Ag-NPs)of the compounds (1-5)were screened to compare their effect with respect to the parent new compounds.The nanoform for compound (3)showed high activity, while the nanoforms of the other compounds showed strong activities towards bacteria and fungi. The data obtained are shown in Table 1. The highest fold increases in area were

observed for (2a) in presence of Ag-NPs solution against staphylococcus aureus (G+), and escherichia coli (G-) and the highest fold increases in area were observed for (5) in presence of Ag-NPs solution against candida albicans and aspergillus Niger.

Synthesis of silver-nanoparticles using the method reported by Sileikaite et al.[35] .

Silver Nanoparticles were prepared by chemical reduction method. All solutions were prepared in distilled water. 50 ml of 0.001 M Silver nitrate was heated to boiling using hot plate magnetic stirrer. To this solution 5 ml of 1% tri-sodium citrate was added drop by drop. During this process solution was mixed vigorously. Solution was heated until color change is evident (yellowish brown). Then it was removed from the heating element and stirred until cool to room temperature. UV/Visible spectrum for the silver nanoparticles in the solution showed λ max at 420 nm due to the surface plasmon resonance effect.[36-38] Transmission electron microscopy is used to determined the morphology and particle size via TEM and SEM images of silver nanoparticle and the nanoforms of compounds (4)and (5) are shown in Fig.(1a),(2a),(3a) and (1b),(2b),(3b) for TEM and SEM respectively.

Table 1: The antimicrobial activities of the compounds (1-5) and their nano-forms.

Inhibition zone in mm (conc.µg/ml)								
Compounds No.	**Candida albicans**	**Fold increase% (nano.-parent)/ parent X100=**	**Aspergillus Niger**	**Fold increase%(nano.-parent)/ parent X100=**	**Staphylococcus aureus (G+)**	**Fold increase%(nano.-parent)/ parent X100=**	**Escherichia coli (G-)**	**Fold increase%(nano.-parent)/ parent X100=**
Tetracycline antibacteria	------		------		**20**		**22**	
Amphotericin antifungal	20		20		------		------	
(1a)	26	15.38	26	15.38	26	19.23	26	19.23
(Ia) nano-form	30		30		31		31	
(1b)	26	15.38	26	15.38	26	23.07	26	23.07
(Ib) nano-form	30		30		32		32	
(2a)	15	66.66	12	108.3	10	150	10	150
(2a) nano-form	25		25		25		25	
(2b)	15	66.66	15	66.66	12	125	15	80
(2b) nano-form	25		25		27		27	
(3)	12	83.33	10	130	0.0		10	130
(3) nano-form	22		23		22		23	
(4)	23	34.78	22	40.90	23	39.13	22	45.45
(4) nano-form	31		31		32		32	
(5)	10	170	11	145.45	12	133.33	14	100
(5) nano-form	27		27		28		28	

Weakly active: less than 10mm, Moderately active: 10-20 mm, Highly active: 20-25 mm, Strong active: more than 25 mm

Transmission electron microscopy (TEM) and (SEM) images of the Ag-NPs solution and the nano-forms of the compound (4) and (5)

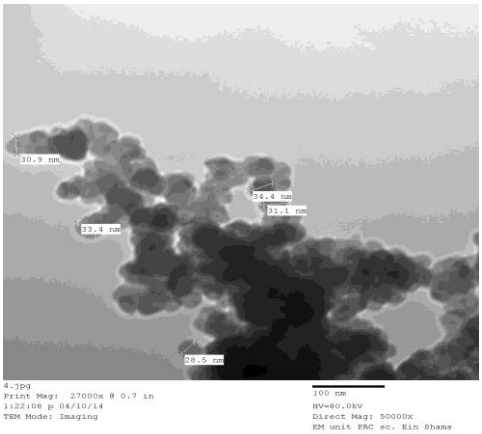


Fig.(1a) TEM Ag-NPs

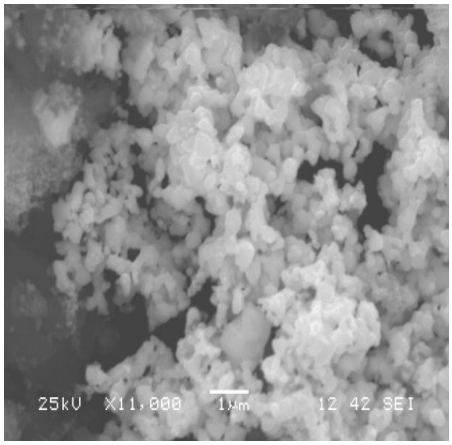


Fig.(1b) SEM Ag -NPs

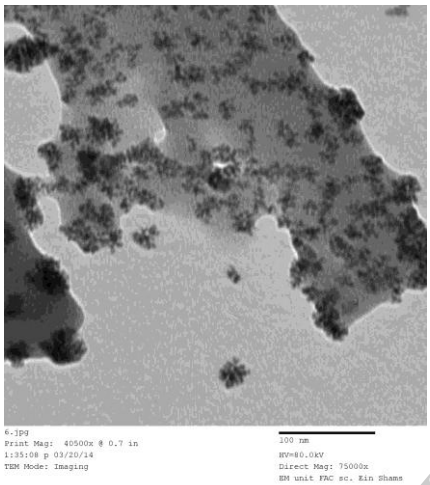


Fig. (2a) TEM micrograph of **compound (4)** after addition of Ag- NPs solution, Scale bar = 100 µm

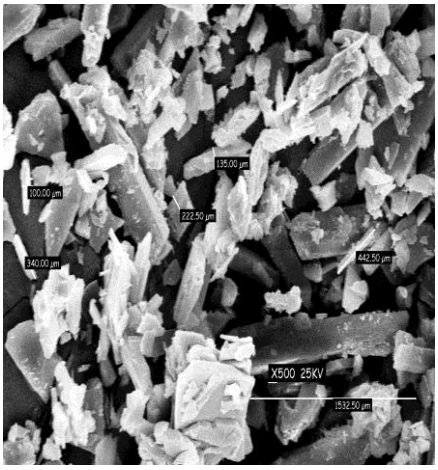


Fig.(2b)SEM of compound (4)
after addition of Ag-NPs solution

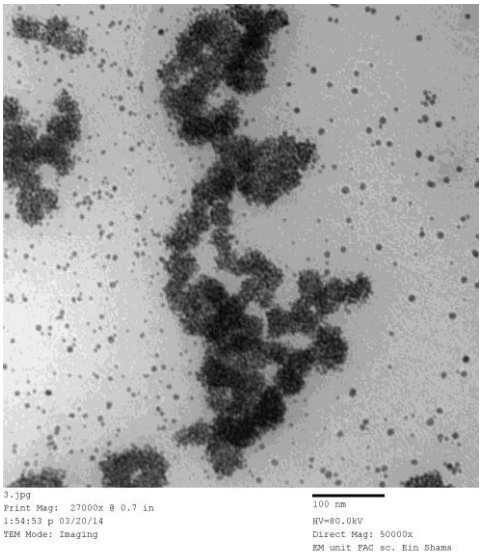


Fig.(3a) TEM of compound (5)
after addition of Ag-NPs solution

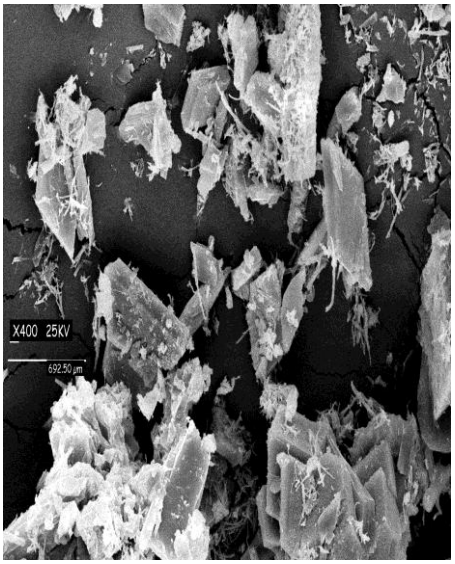


Fig.(3b) SEM of compound (5)
after addition of Ag-NPs solution, Scale bar = 100 µm

V. CYTOTOXICITY

The Anticancer Activity Of The New Synthesized Compound (1b) And Compound (3) Was Tested Against MCF-7 Cancer Cell Lines Using Sulphorhodamine – B (SRB) Assay Following The Method Reported By Vichai And Kirtikara [39].

Procedure:

1. Cells Were Seeded In 96-Well Microtiter Plates At Initial Concentration Of 3x103 Cell/Well In A 10 µl Fresh Medium And Left For 24 Hours To Attach To The Plates.
2. Different Concentrations 0, 5, 12.5, 25, 50 µg/Ml Of Drug Were Added.
3. For Each Drug Concentration, 3 Wells Were Used. The Plates Were Incubated For 48 Hours.

4. The Cells Were Fixed With 50 µl Cold Trichloroacetic Acid 10% Final Concentration For 1 Hour At 4oc.
5. The Plates Were Washed With Distilled Water Using (Automatic Washer Tecan, Germany) And Stained With 50 µl 0.4% SRB Dissolved In 1% Acetic Acid For 30 Minutes At Room Temperature.
6. The Plates Were Washed With 1% Acetic Acid And Air Dried.
7. The Dye Was Solubilized With 100 µl/Well Of 10 M Tris Base (Ph 10.5) And Optical Density (O.D) Of Each Well Was Measured Spectrophotometrically At 570 Nm With An ELISA Microplate Reader (Sunrise Tecan Reader, Germany). The Mean Background Absorbance Was Automatically Subtracted And Mean Values Of Each Drug Concentration Was Calculated. The Experiment Was Repeated 3 Times.

Calculation:
The Percentage Of Cell Survival Was Calculated As Follows:
Surviving Fraction = O.D (Treated Cells)/ O.D. (Control Cells).
The IC50 Values (The Concentrations Of Resveratrol Required To Produce 50% Inhibition Of Cell Growth) Were Also Calculated.
Compound (1a) Showed Good Evaluation Against MCF-7 Cancer Cell Lines [29], The IC50 Value Of It Was Found At 6.83 µg/Ml Comparable To The IC50 Value Of Doxoroubicien 5.6 µg/Ml. Screening The Anticancer Activity Of The Palladated Compound (5) The Result Showed That It Exhibited Anticancer Activity And Its IC50 Value Was Found At 18 µg/Ml Comparable To The IC50 Value Of Doxorubicin 4.2µg/Ml As In Fig.(2).

DRUG CYTOTOXICITY

Conc:Ug/ml	MCF7	MCF7-DOX
0.000	1.000000	1.000000
5.000	0.860377	0.421530
12.500	0.620755	0.413581
25.000	0.365566	0.410807
50.000	0.336604	0.444679

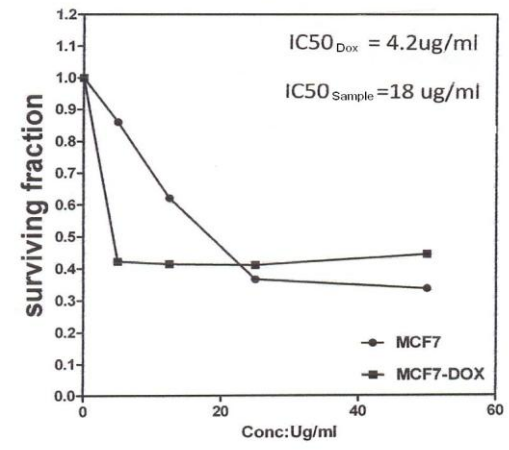


Fig.(2): Drug Cytotoxicity Of Compound (5) And Doxorubicin.

VI. CONCLUSION

2-(2-Oxo-2H-Pyrano[3,2-H]Quinolin-4-Yl) Acetic Acid (1a) And 4-(2,2-Dihydroxy-Vinyl)-2H-Pyrano[3,2-H]Quinolin-2-One (1b)Were Isolated And
N-(2-Amino Ethyl) Propane-1,3-Diamine To Form New Compounds(2a) And (2b). Metallated Products (3),(4)Were Inferred From The Reaction Of (1a)And (1b) With Palladium Chloride And Compound (5) Was Produced From The Reaction With Compounds (2a) And (2b). The Antibacterial And Antifungal Activities Of The All Products Exhibited High To Moderate Activities Except Compound (1a) & (1b)Showed Strong Activities Toward All Types Of Bacteria And Fungi, While Compound (3)Showed No Activity Towards Staphylococcus Aureus (G+). The Effect Of Silver Nano-Particles On All Products Exhibited Potent Activities Ranging From High To Strong Activities. .
The Anticancer Activity Of The Selected Compound (5) Was Screened And Found To Exhibit Anticancer Activity Towards Breast Cancer And Its IC50 Value Was 18 µg/Ml.
2-(2-Oxo-2H-Pyrano[3,2-H]Quinolin-4-Yl) Acetic Acid (1a) And 4-(2,2-Dihydroxy-Vinyl)-2H-Pyrano[3,2-H]Quinolin-2-One (1b) Were Isolated And N-(2-Amino Ethyl) Propane-1,3-Diamine To Form New Compounds(2a) And (2b). Metallated Products (3),(4)Were Inferred From The Reaction Of (1a)And (1b) With Palladium Chloride And Compound (5) Was Produced From The Reaction With Compounds (2a) And (2b). The Antibacterial And Antifungal Activities Of The All Products Exhibited High To Moderate Activities Except Compound (1a) & (1b)Showed Strong Activities Toward All Types Of Bacteria And Fungi, While Compound (3)Showed No Activity Towards Staphylococcus Aureus (G+). The Effect Of Silver Nano-Particles On All Products Exhibited Potent Activities Ranging From High To Strong Activities. The Anticancer Activity Of The Selected Compound (5) Was Screened And Found To Exhibit Anticancer Activity Towards Breast Cancer And Its IC50 Value Was 18 µg/Ml.

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