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Preparation Some of Hydroxamic Acid Derivatives from Honey Wax Compounds and Study the Biological Activity on Cancerous Tumors

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ABSTRACT
In this paper, a number of hydroxamic acid derivatives were prepared from one of the esteric compounds found in beeswax. Palmito Hydroxamic acid was prepared by the reaction of beeswax with hydroxyl amine hydrochloride, using sodium hydroxide as the base medium (pH= 13) with heat escalation at a temperature of (80°C), for two hours. From this compound, the two compounds (*N*-acetoxy-Palmetto Hydroxamic acid) and (N-acetyl-N- acetoxy- Palmito Hydroxamic acid) were prepared by the of reaction (Palmito Hydroxamic acid) with acetyl chloride in certain molar ratios. The synthesized compounds were purified and their melting points were determined. Also, the characterized of these compounds were diagnosed by using (UV.VIS) infrared spectroscopy (FT.IR), and (H-NMR). The biological efficacy of these derivatives as anti-cancer was studied by using one type of cancer cell line for human carcinogenic muscle tissue. By analyzing the results obtained statistically, these compounds were found to have a significant effect on the growth of these cells. Some of these compounds have inhibition effects on the growth of metamorphic cells. The biological antibacterial activity of these synthesized compounds was studied, using two gram - negative and gram - positive pathogenic bacteria. The synthesized compounds exhibited different inhibition capacities, different diameters, depending on the type and concentration of the compound used, as well as the type of bacteria used for the study.

Key words: Beeswax, NaOH, Cancerous Tumors, Biological Antibacterial activity

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INTRODUCTION
Bess wax a glandular secretion of honey bees workers from the intestinal gland located on the lower surface of the working belly rings. In order to produce one kilo of wax, it needs nine kilograms of honey, a large amount of pollen pills and lose (20%) of its whole body protein [1,2] . Wax is composed of (17%) of hydro carbone's, (34%) mono and bi valent alcohols, (31%) a long chain acids such as palmitic acid , (13%) hydroxyl acids and (6%)unknown substance [3,4]. The value therapeutic wax is produced by anti – inflammatory, palliative, laxative and anti- bacterial agents [3]. Fatty acids, pigments and carol, containing one gram of beeswax (50) units of Vitamin A and wax contains other substances with therapeutic properties [5].

Hydroxamic acids refer to a class of organic compounds of the general formula R-CO-NHOH (R=alkyl or aryl), this type of acids is much weaker in acidity than the structurally related carboxylic acids [6,7]. Oxyhydroxamic acid was the first hydroxamic acid discovered in 1869, whose discoverer was Lossen., but studies on these compounds have first started in the 1980's [8]. Hydroxamate ions are considered to be strong bio concentric compounds towards metalions to from a five – ring therefore the metal ion are part of this ring [9,10]. Hydroxamic acids usually bind to metal ions through the two oxygen atoms, but also other binding modes are possible [11]. Hydroxamic acids are also known for their ability to release Nitrous Oxide (NO) which is known for its role in physiological processes [12]. Hydroxamic acids have a variety of applications in biology and medicine [13].Hydroxamic acids derivatives organic compounds with antibacterial and antimicrobial agents to prevent the growth of Fungal and are selective inhibitors for a variety of enzymes such peroxidases, ureases), matrix metal proteases, hydrolases [14]. Hydroxamic acids also represent a wide spectrum of bioactive compounds that have anticancer, anti-malarial, and anti-tuberculosis properties [15]. Hydroxamic acids derivatives are kind of compounds generally low in toxicity , and have a wide spectrum of activities in all types of biological systems ,such as they act variously as growth factors, food, additives tumor inhibitors ,ant leukemic agents ,key pharmacophore in many important chemo therapeutic agents , pigments and cell- division factors[16]. In recent years, the researcher and his group (92 and 93) have studied some hydroxamic acid compounds that act as inhibitors of enzyme (CYP17) hydroxylase) in humans and stop the biosynthesis of androgens by enzyme inhibition (YP17)which is used as a treatment for prostate cancer which is similar to the drug (Abiraterone) (106). Many human clinical trials have been performed using hydroxamic acid derivatives as drugs to treat many diseases [17]. The type (Desferrioxmine), which is used clinically to treat iron poisoning through the capture of iron ion [18, 19]. Many ligand have been prepared for hydroxamic acid derivatives used in the fields of biomedical application such as anti-tumor, has become of great importance [20].

MATERIALS AND CHEMICALS
Bee wax, Ethanol, Hydroxylamine-hydrochloride (Fluka AG, CH-9470, Buchs), Thionyl Chloride, Methanol, Potassium hydroxide, Sodium hydroxide, Sulfuric acid, THF, HCl , KBr,

Experimental

Synthesis of derivatives of hydroxamic acid

Purification of Beeswax from Sugar

The Beeswax was purified from sugars substances by treated with heating 200 mL distal water, five times or until to be free from sugar. The two steps of arise heating degree until melting the wax and decantation in the clean glass to remove the solid material in the bottom visual.

Preparation of Palmito Hydroxamic acid [$CH_3(CH_2)_{14}CONHOH$]

Preparation of Hydroxylamine

Hydroxylamine was prepared by dissolving (25g) of hydroxylamine hydrochloride ($NH_2OH.HCl$) in (150 mL) aqueous ethanol solution (ethanol water 5:1). The resulting solvation mixture was kept at 0°C. Then, added stannous 50 mL 1molar potassium hydroxide with do not allowed the temperature solution more than 5°C. The HCl was neutralized by KOH solution and the precipitate of KCl was removed by filtration to yelled hydroxylamine solution [21,22].

(40) g from Beeswax was dissolved in 100 mL xylene added to Hydroxylamine solution. The pH mixture made between (12-13) by used potassium hydroxide. Refluxed for 1h until appeared red color when testing the mixture by treated with ferric chloride. After completion of the solvent was removed under reduced pressure to get a crud solid precipitate.

Separation and Extraction of (Palmito Hydroxamic acid) from solid precipitate

To a stirred answer of strong precipitate which dissolved in one hundred ml distilled water under reflux condensation for 30 minutes, filtration and eliminated the solvent in vacuum pressure till obtained viscosity yelled. Added a few drops from cons sulfuric acid to yelled hydroxamic acid as a precipitate, filtered, and washed with water and recrystallization with the aid of ethanol. Dried in vacuum gave a white solid. Yield=1.28 g, (98.1%).the resulting compound was identified the use of and seen spectroscopy (UV.ViS), infrared spectroscopy (FT-IR), and spectroscopy (H-NMR).

Determine the Melting Point of the (Palmito Hydroxamic acid) two Sample.

Fill a capillary melting point tube to a depth of 0.2 cm with the recrystallized (Palmito Hydroxamic acid). Place the capillary tube in the melting factor apparatus. Determine its melting point. The (Palmito Hydroxamic acid) got melts at 93 to 95° C.

Preparation of (N-acetyl-N- acetoxy- Palmito Hydroxamic acid)

$CH_3(CH_2)_{14}CO\text{-}NH\text{-}OCO\text{-}CH_3$)

Added 50 g of (*N*-acetoxy- Palmito Hydroxamic acid) ($CH_3(CH_2)_{14}CO\text{-}NH\text{-}OCO\text{-}CH_3$). And (65) ml of acetyl chloride Place it in a 125-mL Erlenmeyer flask. Add 5 drops of concentrated sulfuric acid, H_2SO_4, to the mixture. Gently heat the flask in a boiling water bath for about 10 minutes. Remove the flask from the hot water bath and add 10 mL of deionized ice water to decompose any excess acetyl chloride. At the end of this time, the product does not give the ferric chloride test, indicating complete acetylation upon cooling, the crystalline. Collect the crystals by vacuum filtration. Wash the crystals with two 10-mL volumes of ice water. Maintain the vacuum to air dry the crystals. The resulting compound was diagnosed using and visible spectroscopy (UV.VIS), infrared spectroscopy (FT-IR), and spectroscopy (H-NMR).

Preparation of complexes (Palmetto Hydroxamic acid) with ferric ion

An ethanol solution (50 mL) of the prepared hydroxamic acid (2.62g), a solution of ferric chloride (1.62 g, 0.015mol) in ethanol (5 mL) was added. The reaction mixture was allowed to stir and heating at 60°C for one hour, resulting in the formation of a solid mass which was filtered, collected and washed with Ethanol (5 mL), and then dried under vacuum [23,24]. Elemental analysis data, colures, and yields for the complexes are given in Table (1).

Preparation of complexes (Palmetto Hydroxamic acid) with Copper ion

The method used was similar to that iron ion complexes, the quantities of the other reagents were adjusted accordingly. An identical work-up procedure gave the required complexes as shown in Table (1).

Table (1): Colors, yields, melting points and metal salts quantities of Fe^{3+} and Cu^{2+}-complexes:

Metal ion	ligand	Weight of metal salt (g)	Weight of complex	Yield (%)	Colour	m.p. °C
Fe^{3+}	*N*- acetoxy- Palmito Hydroxamic acid	0.06	0.29	46.72	Red	293-295
Cu^{2+}	*N*- acetoxy- Palmito Hydroxamic acid	0.12		56.89	Dark red	308*

Study of the biological activity of prepared compounds against cancer cells

The effect of prepared Hydroxamic acid derivatives on the growth of one type of cancer cellular lines of human muscle tissue was studied. Tests were carried out in the Cancer Research Department of the Biotechnology Research Center of Al-Nahrain University. In this way, the percentage of cells was calculated under optimal growth conditions without adding Hydroxamic acid derivatives. Aqueous solutions were then added to the Hydroxamic acid derivatives prepared in this study at different concentrations limits (10 - 100) mg to study their effect on cell growth in the selected cancer line.

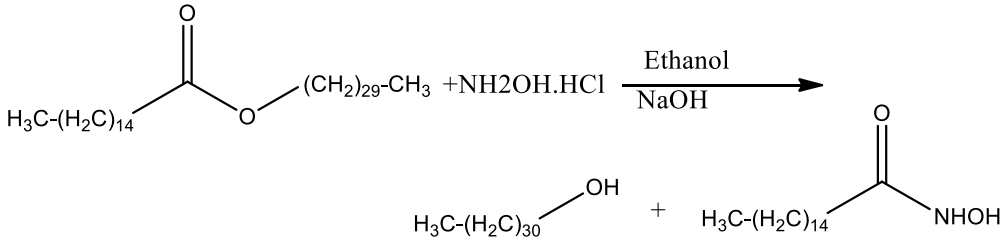
Biological Effectiveness of Hydroxamic Acid Derivatives Anti-Bacterial

The method (Agar- well diffusin method) according to the method (Kirby Bauer) [15]was used to measure the sensitivity of the bacteria used in the research to different concentrations of hydroxamic acid derivatives on two types of bacteria Gram positive(Staphylococcus aurous) and negative Gram(Escherichia coli) isolated in the transplant laboratory of the Children's Hospital in Ramadi [25].

Induction was used medium(Mueller Hinton ager) to test the bacterial sensitivity of the prepared hydroxamic acid derivatives after which the dishes were placed in the incubator and the temperature (37) degrees C for a period of (24) hours and then measured the inhibition diameter (Inhibition Zone) [26,27] In each hole by the ruler and record the results .

RESULT AND DISCUSSION

The compound of Palmetto Hydroxamic acid was prepared in alkaline media at pH (12-13) *via* directive reaction in Ethanolic solution between Esteric compound in Beeswax and Hydroxyl amine-hydrochloride. The product hydroxamic acid was characterized by phasic-chemical methods [25]. As scheme follow:



The (Palmito Hydroxamic acid) gave a white solid. Yield=1.28 g, (98.1%). The electronic spectra of the Hydroxamic acid exhibited various value according to the bands related to the $\pi \rightarrow \pi^*$ and (C.T) transitions, respectively, Bands in the range of (234-287) nm related to $\pi \rightarrow \pi^*$. Bands in the range of (332-39) nm related to the charge transfer transition (C.T). The infrared spectrum (FTIR) Fig (3) of (Palmito Hydroxamic acid) showed the characteristic absorption bands of FTIR (cm^{-1}): 3270- 3570 stir (Overlapping OH with NH), 2910-2990 aliphatic -H), 1730 Stir(C=O), 1240 (N-H). NMR data (ppm), ^{1}H (400 MHz, DMSO-d6): 2.09 (S, H, O*H*), 1.29-2.50 (Complexes of Aliphatic protons-*H*), 8.00 (N-*H*) Fig. (4).

The (N- acetoxy- Palmito Hydroxamic acid) obtained melts at 76 to 80° C. and recrystallized to Yield=1.28 g, (98.1%). The electronic spectra of the hydroxamic acid exhibited various value according to the bands related to the $\pi \rightarrow \pi^*$ and (C.T) transitions, respectively, Bands in the range of (226-279) nm related to $\pi \rightarrow \pi^*$. Bands in the range of (326-391) nm related to the charge transfer transition (C.T). The infrared spectrum(FTIR) Fig(5) of (N- acetoxy- Palmito Hydroxamic acid) showed the characteristic absorption bands of FTIR (cm^{-1}): 3258 í(-NH), 2857 aliphatic (C-H), 1620 ä(N-H). NMR data (ppm), 1H (400 MHz, DMSO-d6): 8.00 (S, 1H, NH), 2.28 (S, CH3-CO), 2.34-0.88 (over lapping 31-H, aliphatic-H) Fig. (6).

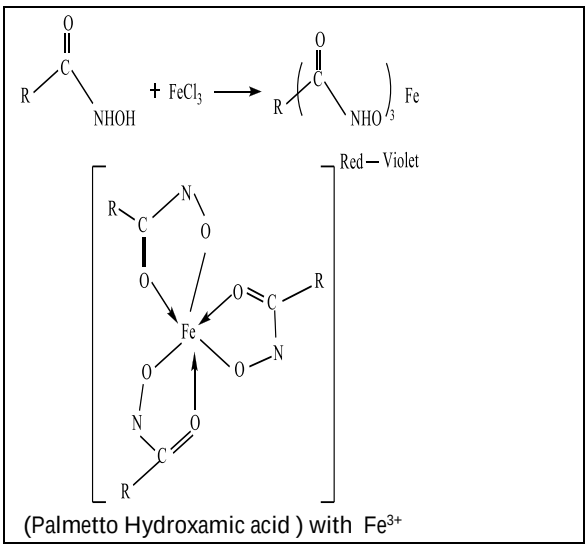
The (N-acetyl-N- acetoxy- Palmito Hydroxamic acid) obtained melts at 76 to80° C. and recrystallized to Yield=1.28 g, (98.1%). The electronic spectra of the hydroxamic acid exhibited various value according to the bands related to the $\pi \rightarrow \pi^*$ and (C.T) transitions, respectively, Bands in the range of (234-287) nm related to $\pi \rightarrow \pi^*$. Bands in the range of (332-39) nm related to the charge transfer transition (C.T).

The infrared spectrum (FTIR) Fig (7) of (N- acetoxy-Palmito Hydroxamic acid) showed the characteristic absorption bands. The FTIR spectra of hydroximic acid exhibits bands related to the formation combined bands ν (N-H) and (O-H) stretching for the compound has been detected around 3270–3570 cm^{-1}. The lower value for ν(C=O) in the free ligand at 1730-1770 cm^{-1}. Band observed at 1240-1285 cm^{-1} is a week band, which attributed to ν (C-N). The spectra display bands between 2910-2990 cm^{-1}, which related to aliphatic bands ν(C-H).

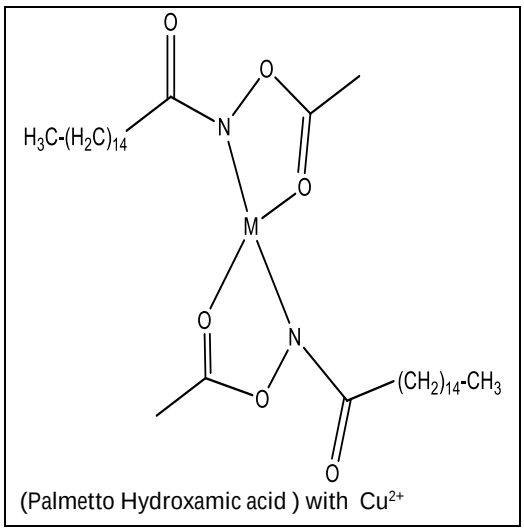
The ^{1}H-NMR spectra of the hydroximic acid show, two important singlet peaks are present for the OH protons which appear filed at (2.09ppm). While the NH protons of the compound are appear as singlet peak at (8.00ppm). The chemical shift values of the aliphatic proton groups are noticed between (1.29-2.50ppm), Fig. (8). these values are agreement with the chemical shift values of hydroxamic acid protons in a literature.

Cmplexes (Palmetto Hydroxamic acid) with (Fe^{3+} and Cu^{2+})

The complexes (4, 5) were prepared by the interaction of (Palmetto Hydroxamic acid) as a two-tooth chelated ligand (O, O, Di donate ligand) with a single negative charge after the acid proton loses the hydroxyl group, where each ligand binds with the metal ion (M^{n+}) by the hydroxyl group, as well as by .The oxygen of the carbonyl group of hydroxamic acid in ligand. Three molecules of hydroxamic acid replace the molecules associated with the ferric ion (Fe^{3+}). In the case of binary copper ion, two molecules of (Palmetto Hydroxamic acid) will replace the molecules associated with the binary (Cu^{2+}) ion, giving a neutral and tetrahedral complex, so we can expect the structural language of the ionic complexes (Fe^{3+},Cu^{2+}), with the derivative (Palmetto Hydroxamic acid) in the following structural formulas. :



(Palmetto Hydroxamic acid) with Fe^{3+}



(Palmetto Hydroxamic acid) with Cu^{2+}

The ferric complex with (Palmetto Hydroxamic acid) gave three main bundles in the UV region. Where the first beam was very weak resulting from the transfer of charge, which is within the range (203-275) nm. The second beam is the result of electronic transmission ($\pi \rightarrow \pi^{*}$) within the range (310-340) nm, and the third beam is also electronic transmission ($n \rightarrow \pi^{*}$) and is within the range (350-375) nm.

The UV and visible spectrum also showed an absorption beam in the visible region within the range of 430-640 nm. The infrared spectroscopy of ferric complex with (Palmetto Hydroxamic acid) showed an absorption package for the pentagonal group (N-H) at (3400-3450) cm^{-1}, an esoteric carbonyl group(C=O) at (1710-1750) cm^{-1}, and an acid carbonyl group (C=O) The pentagonal ring formed at (1610-1690) cm^{-1} and the aliphatic absorption bundle (M-O) at (400-500) cm^{-1} figure (9) .

As well as copper complex with ((Palmetto Hydroxamic acid)) gave three main bundles in the ultraviolet region. Where the first beam was very weak resulting from the transfer of charge, which is within the range (223-278) nm. The second beam is the result of electronic transmission ($\pi \rightarrow \pi^{*}$) within the range (305-345) nm, and the third beam is also electronic transmission ($n \rightarrow \pi^{*}$) and is within the range (340-369) nm.The UV and visible spectrum also showed an absorption beam in the visible region within the range of (420-670) nm. The infrared spectroscopy of ferric complex with (Palmetto Hydroxamic acid) showed an absorption package for the pentagonal group (N-H) at (3360-3420) cm^{-1}, an esoteric carbonyl group(C=O) at (1715-1760) cm^{-1}, and an acid carbonyl group (C=O) .The pentagonal ring formed at (1620-1680) cm^{-1} and the aliphatic absorption bundle (M-O) at (420-515) cm^{-1} figure(10).

Results of biological activity of hydroxamic acid derivatives against cancers

The biological activity of hydroxamic acid derivatives from esoteric compounds in honey beeswax synthesis against cancer cell growth was studied. One type of cell line was used for human muscle tissue. Using the control material, in this study the percentage of cells was calculated under optimal conditions without adding the prepared compounds. The aqueous solutions were then added to the derivatives of Hydroxamic acid at different concentrations. The test results are shown in Table (2).

Table (2): The biological activity of Hydroxamic acid derivatives against cancers of Carcinogenic cells of human muscle tissue:

Comp. / Con.	Palmito Hydroxamic acid	*N* – acetoxy – Palmito Hydroxamic acid	N-acetyl-N-acetoxy- Palmito Hydroxamic acid	complexes (Palmetto Hydroxamic acid) with ferric ion	complexes (Palmetto Hydroxamic acid) with Copper ion
20mg	0.11	0.123	0.1	0.12	0.09
40mg	0.13	0.132	0.13	0.125	0.113
60mg	0.134	0.136	0.135	0.132	0.124
80mg	0.141	0.138	0.137	0.14	0.135
100mg	0.146	0.141	0.143	0.146	0.145

Control (OD) = 0.17

The results obtained were analyzed statistically. The inhibition rate was calculated using the following mathematical relationship:

$$\textbf{Inhibition Rate(IR)} = \frac{\boldsymbol{Control(OD) - Test(OD)}}{\boldsymbol{Control(OD)}} \times \mathbf{100}$$

Table (3) shows the Rate of inhibition of cancer cell growth by Hydroxamic acid derivatives prepared in this study at different concentrations.

Table (3): Inhibition rate of cancer cell growth by Hydroxamic acid derivatives of Carcinogenic cells of human muscle tissue:

Comb / Con	**Inhibition Rate(IR)%**				
	Palmito Hydroxamic acid	*N*-acetoxy-Palmito Hydroxamic acid	N-acetyl-N-acetoxy-Palmito Hydroxamic acid	complexes (Palmetto Hydroxamic acid) with ferric ion	complexes (Palmetto Hydroxamic acid) with Copper ion
20mg	35.29	27.64	32.35	29.41	41.17
40mg	23.529	22.35	23.52	26.47	33.52
60mg	21.17	20.00	20.58	22.35	27.05
80mg	17.05	18.82	19.41	17.64	20.58
100mg	14.11	17.05	14.11	15.52	14.70

The results obtained were analyzed statistically as shows the effect of the prepared compounds on the percentage of cells. Compound Palmetto Hydroxamic acid showed a greater effect than the other prepared compounds. The results obtained were analyzed statistically in a way that the results were as in the chart [26] which shows the effect of the prepared compounds on the percentage of cells when using cellular line. The compound (1) showed a greater effect than the other prepared compounds. The effect was significant P < 0.05 and this result is identical to that published in the literature [19, 24]. OtherH ydroxamic acid derivatives (2 and 3) showed significant effect (P <05) but the inhibition rate was lower than the first compound [27, 28]. The biological activity of Hydroxamic acid compounds in inhibiting and stopping the growth of cancer cells is due to the withdrawal of iron ion from cancer cells. This is because Hydroxamic acid compounds are highly corrosive to ferric ion, being chelated bipolar compounds. This leads to deprivation of cancer cells from iron, which may be the cause of inhibition or stop the growth of cancer cells [29, 30].

Results of the study of the biological activity of antibacterial activity

The biological activity of antibacterial activity showed an active antibacterial effect of Hydroxamic acid derivatives prepared in this study and compared with the standard drug (amoxicillin). Figure (1) shows the results of the effectiveness of the Hydroxamic acid derivatives prepared on two types of pathogenic bacteria positive Gram (Aurous Staphylococcus) and negative gram (Escherichia Coli), but to varying degrees depending on the concentration and type of bacteria [31,32].

The compound (Palmetto Hydroxamic acid) showed the highest efficacy at the concentration of 25 mg / ml. The inhibition diameter was (19) mm for positive bacteria gram (Aurous Staphylococcus) and (14) mm for negative bacteria gram (Escherichia Coli), followed by the rest of the concentrations at different rates. The inhibitory action of this compound against many bacterial species is due to the presence of hydroxyl groups (- OH), which have the ability to form hydrogen bonds between the hydroxyl group in that compound and the water molecules in the bacterial cell in which water is 90% by weight. To disable bacterial actions [33]. Compared to the standard drug (Amoxicillin), the biological activity of the compound was found to be lower than the standard drug.

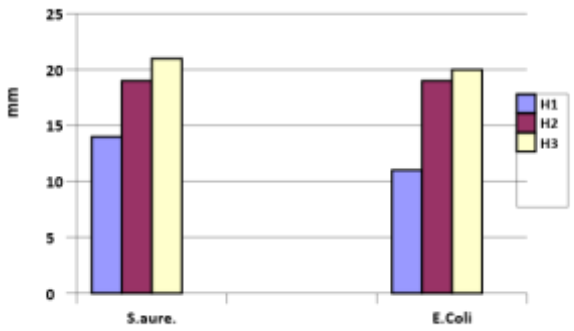


Figure 1: The effect of Palmetto hydroxamic acid on the growth of bacteria

Figure (2) shows the results of the effectiveness of the compounds (N- acetoxy- Palmito Hydroxamic acid and N-acetyl-N- acetoxy- Palmito Hydroxamic acid) ,showed a relatively high activity against a type of bacterial strains positive gram (Aurous Staphylococcus) and the lowest inhibitory concentration (30) mg / ml where the

inhibition diameter was (16) mm for the compound (N-acetoxy- Palmito Hydroxamic acid) and (13) mm for compound (N-acetyl-N- acetoxy- Palmito Hydroxamic acid) but not Active against this of gram negative bacterial strains (Escherichia Coli) [34] .

The compounds (Palmetto Hydroxamic acid) with ferric ion and complex (Palmetto Hydroxamic acid) with Copper ion) showed a wide range of antibacterial activity of gram positive and negative gram (Aurous Staphylococcus and Escherichia Coli) and the antibacterial activity was higher than commercial antibiotics such as amoxicillin. Where the initial test of complex (Palmetto Hydroxamic acid) with ferric ion) of antibacterial activity showed the highest effectiveness at the concentration (30) mg / ml where the inhibition diameter (26) for bacteria positive gram(Aurous Staphylococcus) and (18) mm for negative bacteria gram(Escherichia Coli) followed by the rest of the concentrations and different rates[36].

Also, the initial test of compound (complex (Palmetto Hydroxamic acid) with Copper ion)) for antibacterial activity showed the highest efficacy at concentration (30) mg / ml where the inhibition diameter reached (23) mm for bacteria positive gram(Aurous Staphylococcus) and (17) mm for negative bacteria gram(Escherichia Coli) followed by the rest of the concentrations and different rates[37] . One of the reasons for the ability of these compounds to inhibit the yolk effectiveness of a number of bacteria and mycobacteria is the presence of oxygen and nitrogen atoms, which makes them susceptible to the various elements that contribute to the inhibition of biological activity of these organisms (38).

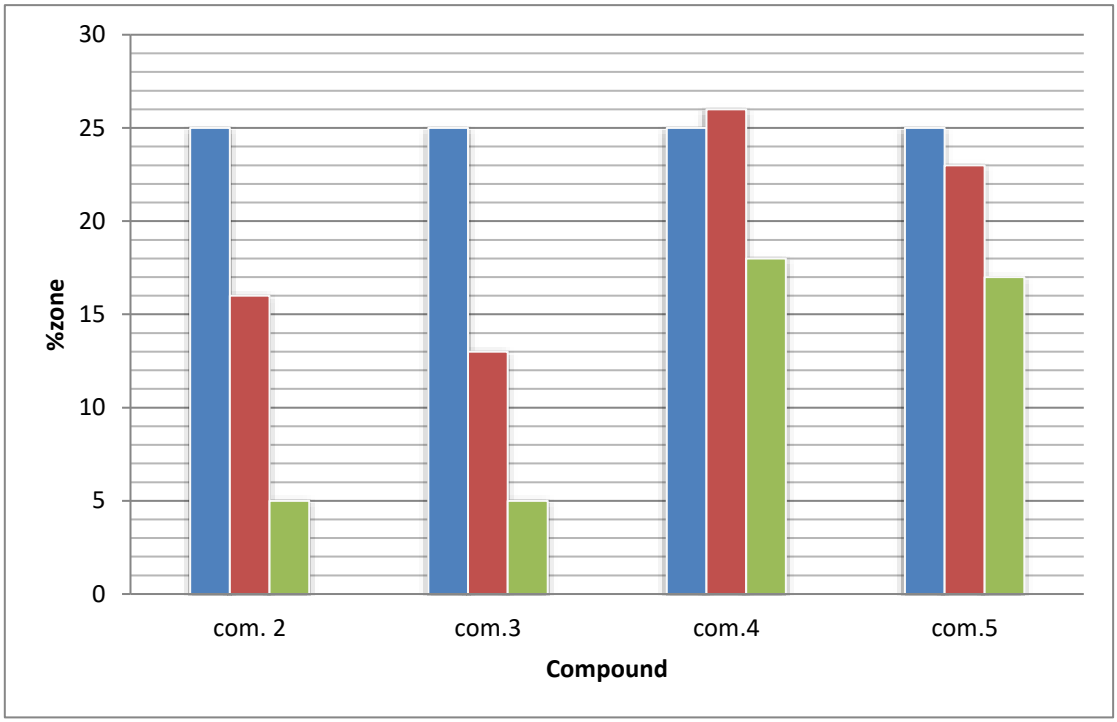


Figure 2: The effect of compounds (2, 3, 4, and 5) on the growth of bacteria

CONCLUSIONS

1-The f Hydroxamic acid can be prepared from reaction compounds contain Ester group with Hydroxyl amine-hydrochloride in alkaline media at pH (12-13).

2- Hydroxamic acids have a variety of applications in biology and medicine, with antibacterial and antimicrobial agents to prevent the growth of Fungal.

3- The biological efficacy of these derivatives prepared as anti-cancer tumors was studied by using one type of cancer cellular lines for human carcinogenic muscle tissue.

4- The synthesized compounds exhibited different inhibition capacities, different diameters, depending on the type and concentration of the compound used, as well as the type of bacteria used for the study.

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Extension one

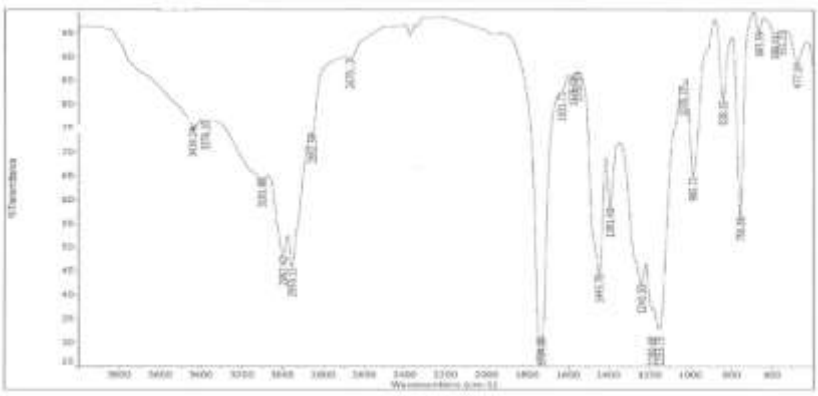

Figure 3: FTIR spectra of the Palmito Hydroxamic acid

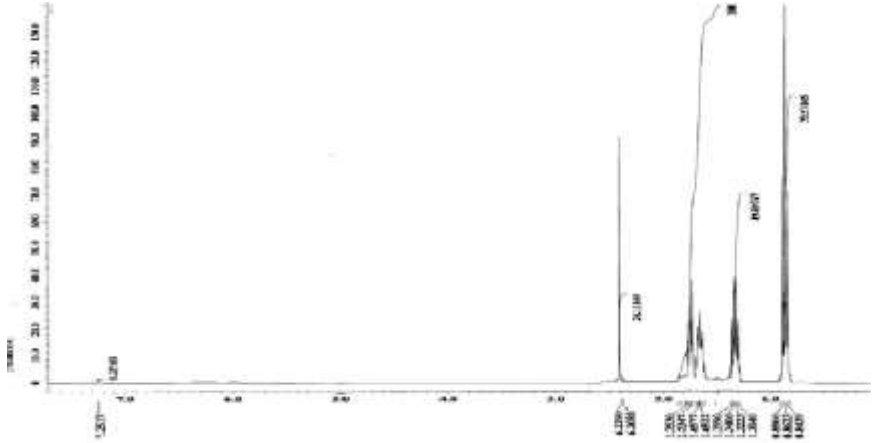

Figure 4: ^{1}H-NMR spectrum of the Palmito Hydroxamic acid

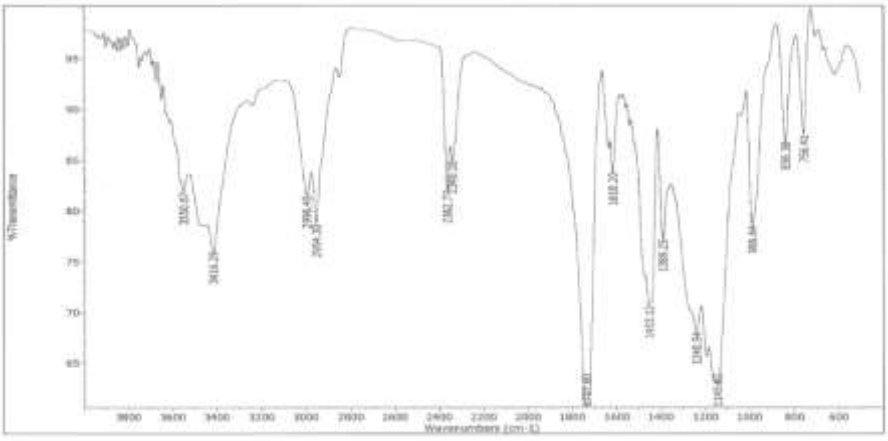

Figure 5: FTIR spectra of the N-acetoxy- palmitamide

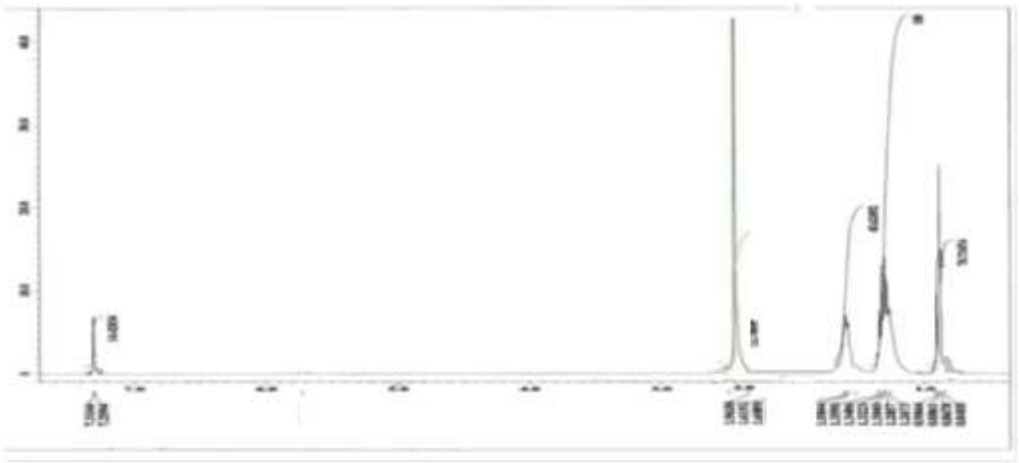

Figure 6: ^{1}H-NMR spectrum of the N-acetoxy- palmitamide

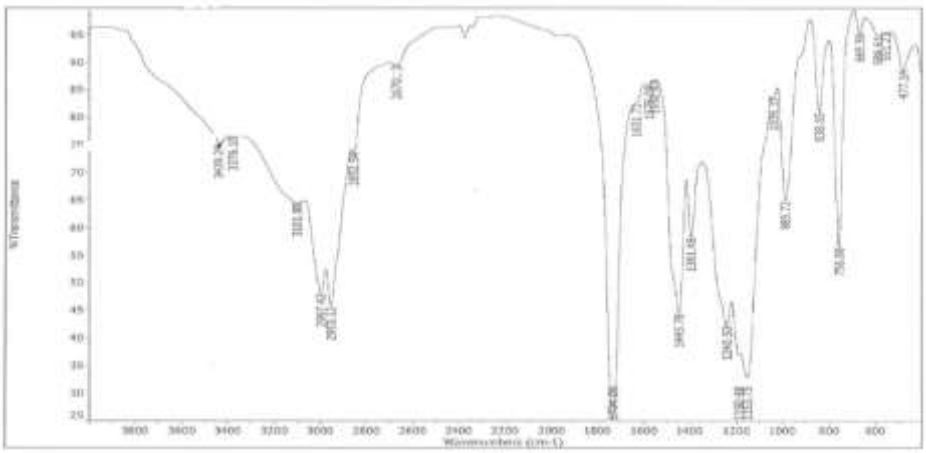

Figure 7: FTIR spectra of the (N-acetyl-N- acetoxy- Palmito Hydroxamic acid)

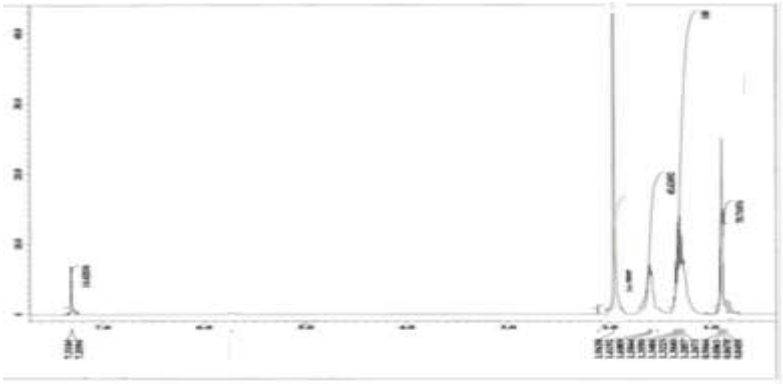

Figure 8: ^{1}H-NMR spectrum of the (N-acetyl-N- acetoxy- Palmito Hydroxamic acid)

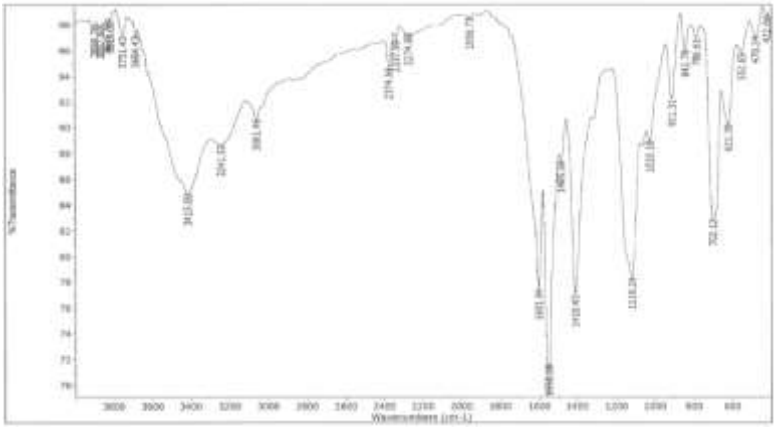

Figure 9: FTIR spectra of the Cmplexes (Palmetto Hydroxamic acid) with Fe^{3+}

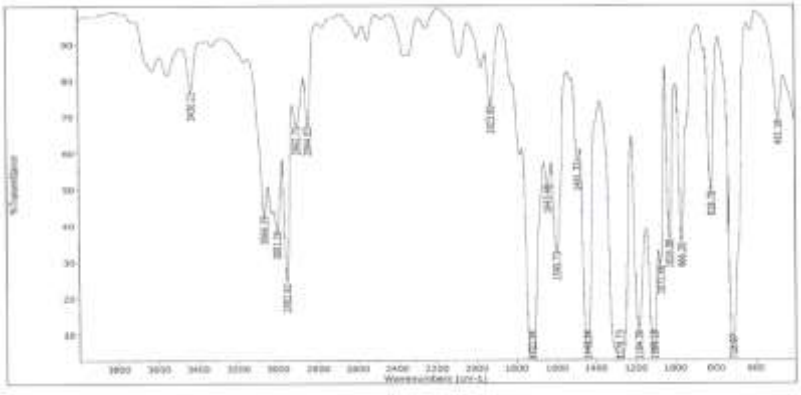

Figure 10: FTIR spectra of the Cmplexes (Palmetto Hydroxamic acid) with Cu^{2+}

تحضيربعض مشتقات حامض الهيدروكساميك من المركبات الموجودة في شمع العسل ودراسة تأثيرها البيولوجي على الأورام السرطانية

الخلاصـــــة :-

Palmito في هذا البحث ، تم تحضير عدد من مشتقات حمض الهيدروكساميك من أحد مركبات الأسترية الموجودة في شمع العسل. حيث تم تحضير المركب ( ) مع تصعيد حراري عند درجة حرارة(pH=13) ، من خلال تفاعل شمع العسل مع هيدروكسيل أمين هيدروكلورايد بوسط قاعدي عند (Hydroxamic acid - أسيتوكسي- بالميتو N- أسيتيل- N- أسيتوكسي- حمض بالميتو هيدروكساميك) و (80N) ، ولمدة ساعتين. ومن هذا المركب ، تم تحضير المركبين (°C( ) مع كلوريد الأسيتيل. تم تنقية المركبات المحضرة وتم تحديد نقطة انصهارها . تم تشخيصPalmito Hydroxamic acidهيدروكساميك) ,وذلك من تفاعل ( ). تمت دراسة الفعالية البيولوجية لهذه المشتقات التي تم تحضيرها كمضادا ت للأورامH-NMR) ،) و ((FT.IR))، (UV.VISهذه المركبات باستخدام تقنيات السرطانية , باستخدام نوع واحد من الخطوط الخلوية السرطانية لنسيج عضلي بشري مسرطن . من خلال تحليل النتائج التي تم الحصول عليها إحصائيا ، تم العثور على هذه المركبات لها تأثير كبير على نمو هذه الخلايا. بعض هذه المركبات لها آثار تثبيط على نمو الخلايا المتحولة. وكذلك تمت دراسة النشاط البيولوجي المضاد للبكتيريا لهذه المركبات المحضرة , باستخدام نوعيين من الجراثيم موجبة غرام والسالبة غرام. أظهرت المركبات المركبة قدرات تثبيط مختلفة ، بأقطار مختلفة ، اعتمادًا على نوع وتركيز المركب المستخدم ، وكذلك نوع البكتيريا المستخدمة للدراسة.