مجلة

كلية المصطفى الجامعة

مجلة علمية محكمة نصف سنوية

العدد الخاص بالمؤتمر العلمي الدولي السادس

(التطور المعرفي واستشراف بناء المستقبل)

٦-٧/آيار/٢٠٢٣

الرقم الدولي : ISSN2522-3097

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١٤٤٤ هـ **٢٠٢٣ م**

وزارة التعليم العالي والبحث العلمي

كلية المصطفى الجامعة

وقائع المؤتمر العلمي الدولي السادس

قال تعالى :

وَقُلِ اعْمَلُوا فَسَيَرَى اللَّهُ عَمَلَكُمْ وَرَسُولُهُ وَالْمُؤْمِنُونَ)

برعاية معالي وزير التعليم العالي والبحث العلمي

(الدكتور نعيم العبودي) المحترم

وتحت شعار (التطور المعرفي واستشراف بناء المستقبل)

تقيم كلية المصطفى الجامعة مؤتمرها العلمي الدولي السادس

وذلك على قاعة فندق المنصور ميليا في تمام الساعة التاسعة من صباح يومي

السبت والاحد الموافقين ٦-٧/آيار/٢٠٢٣

الهيئة الاستشارية:

هيئة التحرير:

اللجنة التحضيرية للمؤتمر :

- د. خالد علي عبيد / رئيساً
- أ.د. قتيبة عباس حمد / عضواً
- د . حسام ضياء كامل / عضواً
- د. علي حسين علي / عضواً
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- م.م. عمر واثق طه / عضواً
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- م.م. مرتضى هادي عبد / عضواً
- السيدة إيمان ليث أكرم / المعلوماتية
- الأستاذ حاتم المسعودي / مسؤول إ لاعلام

اللجنة العلمية للمؤتمر :

- أ.د. هادي حسن جاسم /عميد كلية المصطفى الجامعة
- أ.د. محمد خير الغباني / رئيس اتحاد الجامعات الدولي
- أ.د. خالد علي المياح / الجامعة المستنصرية
- أ.م. محمد علي عبد الرحمن / الجامعة المستنصرية
- أ.د . أحمد ياسين عبد علي / الجامعة العراقية
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- أ.د. سالم علي عباس / كلية المصطفى الجامعة
- أ.د. نضال عبد الواحد علي /كلية المصطفى الجامعة
- أ.م.د. أحمد زيدان محمد / جامعة بغداد
- أ.م.د. سهير إبراهيم حاجم / كلية المصطفى الجامعة
- أ.م.د. أحمد طارق نعمان / كلية المصطفى الجامعة

قواعد النشر في المجلة

١- تتخصص المجلة بنشر البحوث ذات التخصصات العلمية والإنسانية .

٢- تعرض البحوث المقدمة للمجلة على هيئة التحرير؛ لبيان ملاءمتها ويحق لهيئة التحرير أن تعتذر عن قبول البحث .

٣- يتم عرض البحث مسبقاً على لجنة السلامة اللغوية ولجنة السلامة الفكرية بالنسبة للتخصصات الإنسانية قبل إرسال البحث إلى التحكيم العلمي .

٤- تلتزم هيئة التحرير بإرسال البحوث إلى خبراء علميين من الاختصاص نفسه عدد (٢) وفي حالة الرفض من أحدهم يرسل إلى خبير ثالث لغرض الترجيح .

٥- تلتزم هيئة التحرير بعدم الكشف عن أسماء المحكّمين ، لضمان سرية التحكيم ولرفع، الرصانة العلمية وكذلك تكون المعلومات الخاصة بهوية الباحث في الصفحة الأولى من البحث فقط . وأن يلتزم الباحث بعدم الإشارة إلى هويته أو مكان عمله في ثنايا البحث .

٦- تكون حقوق الطبع للبحث ملكاً للمجلة عند قبوله للنشر، ولا يحق النقل والاقتباس عنه إلا بعد الإشارة إلى المجلة .

٧- لا يجوز نشر أكثر من بحث للباحث في العدد الواحد .

٨- تحتفظ هيئة التحرير بحق أولوية النشر للبحوث مع مراعاة التنويع في النشر بحسب المحاور المعتمدة .

٩- ما ينشر في المجلة من بحوث ودراسات تعبّر عن رأي أصحابها ولا تعبر بالضرورة عن وجهة نظر هيئة تحرير المجلة أو وجهة نظر الكلية .

شروط النشر :

١- أن لا يكون البحث مشاركاً في مؤتمر أو ندوة علمية سابقاً أو مقدما للنشر في مجلة علمية أخرى .

٢- يقدّم البحث على قرص مدمج مع نسخة ورقية أو يرسل على البريد الإلكتروني: info@almustafauniversity.edu.iq

٣- أن لا يزيد عدد صفحات البحث عن٣٠ صفحة .

٤- أن لا يزيد عدد المشتركين على ثلاثة باحثين في البحث الواحد .

٥-يطبع البحث على ورق (A4) ونوع الخط (Simplified Arabic) بالنسبة للبحوث باللغة العربية و(Times New Roman) بالنسبة للبحوث باللغة الانكليزية ويكون

حجم الخط (١٤) للمتن والهامش (١٢) .

اهداف المؤتمر :

١-تفعيل دور المؤسسات الحكومية وغير الحكومية في تقويم وتصحيح الواقع العراقي المتمثل بالجوانب السياسية والقانونية والاقتصادية .

٢-ايجاد الوسائل والسبل الكفيلة بتحقيق التكامل المنشود بين المؤسسات الحكومية وبين المؤسسات غير الحكومية في المجالات كافة .

٣-تشجيع المؤسسات كافة للانخراط في خدمة المجتمع وتقديم الخدمات والمتطلبات الكفيلة بتحقيق رفاهية افضل لافراد المجتمع .

٤-تفعيل وتشجيع القطاع الخاص لاخذ دوره في عمليه الاصلاح والتغيير والدفع بعجلة التقدم الاقتصادي .

٥-بيان دور المؤسسات الحكومية في الدفع بعملية الاصلاح والتغيير في المجالات كافة .

٦-اقتراح التشريعات والقوانين اللازمة ورفعها للجهات ذات العلاقة لاعتمادها واقرارها لغرض تحقيق متطلبات التغيير والاصلاح بشكل ينسجم مع طموحات افراد المجتمع العراقي .

محاور المؤتمر:

- **محور الدراسات المستقبلية**
- **محور براءات الاختراع**
- **محور جودة التعليم العالي ورصانة البحث العلمي**
- **محور دور التطور التكنلوجي والمعرفي في استشراف المستقبل .**
- **محور الدراسات العلمية في البناء المعرفي والعلمي واثرها في في تطور المجتمعات فكريا وعلمياً .**

كلمة المؤتمر:

بسم الله الرحمن الرحيم

والصلاة والسلام على اشرف خلق الله سيدنا محمد وعلى اله واصحابه الغر المياحين....

السيد ممثل وزير التعليم العالي والبحث العلمي الاستاذ

(الدكتور نعيم عبد ياسر العبودي) السادة رؤساء الجامعات وعمداء الكليات المحترمون ، السادة الحضور والضيوف الكرام المحترمون مع حفظ المقامات والالقاب

السلام عليكم ورحمة الله وبركاته..

تحت شعار (التطور المعرفي واستشراف بناء المستقبل) ينعقد المؤتمر الدولي السادس لكلية المصطفى الجامعة بمشاركة نخبة من الاساتذة والباحثين من داخل الكلية ومن خارجه وبمختلف الاختصاصات العلمية والادبية. لقد دأبت كلية المصطفى الجامعة منذ انطلاقها الى تطوير الافاق العلمية والمعرفية واكتساب الطلبة جميع المهارات النظرية والعلمية الحديثة ،وذلك من خلال استخدام اساليب تعليمية متقدمة ومناهج علمية رصينة شرط المحافظة على التقاليد والقيم الجامعية التي تحفظ اصول العلم وتاريخه المشرف..

من هذا المنطلق بذلت الكلية جهودا" حثيثة من اجل الارتقاء بالمستوى العلمي لرفع كفائت الطلبة والاساتذة معا"، اسهاما" منها في رفد سوق العمل باحتياجاته المختلفة في شتى الاختصاصات وقد تم استحداث العديد من الاقسام العلمية ضمن المعايير الدولية وبالتحديد تلك التي يتطلبها سوق العمل وقد حصلت كلية المصطفى الجامعة على مراتب علمية عالية وفق تصانيف الجودة المحلية منها والعالمية.

وقد اسهمت هذه الجهود في معالجة اغلب المشكلات التي تواجه بلدنا من خلال عقد المؤتمرات العلمية والندوات وورش العمل المختلفة المحلية منها والدولية سلط الضوء فيها على تحديد اهم المعوقات ووضع الطرق والاساليب المختلفة لمعالجتها بأسلوب علمي أعتمدت فيها البحوث العلمية التي قدمت في هذه المؤتمرات العلمية..

وما مؤتمرنا السادس هذا سوى مناراً جديداً نؤكد فيه تحمل المسؤولية المشتركة التي تقع على عاتق القطاع العام والقطاع الخاص في صناعة غدٍ مشرق للأجيال القادمة من ابناء شعبنا العزيز..

وفي الختام نتقدم بالشكر والامتنان لجميع المسؤولين والحضور الكريم والباحثين الذين اسهموا في انجاح هذا المؤتمر والسلام عليكم ورحمة الله وبركاته.

أ.د. هادي حسن جاسم

عميد كلية المصطفى الجامعة

منهاج المؤتمر العلمي الدولي السادس (التطور المعرفي واستشراف بناء المستقبل)

اليوم الاول السبت الموافق ٢٠٢٣/٥/٦

ت	المنهاج platform		الوقت time	الملاحظات Notes
	ترحيب بالحضور الكرام Welcome honorable guests		9:30 AM	
١	النشيد الوطني National anthem		9:35 AM	
٢	تلاوة أيٍ من الذكر الحكيم Reading the Koran		9:40 AM	المقرء محمد سالم القريشي
٣	كلمة اللجنة العلمية The word of the scientific committee		9:45 AM	أ.د. هادي حسن جاسم عميد الكلية
٤	كلمة وزارة التعليم العالي والبحث العلمي Speech of the Ministry of Higher Education and Scientific Research		9:55 AM	
٥	فيلم وثائقي عن كليه المصطفى A documentary film about Al-Mustafa College		10:05 AM	
٦				رئيس الجلسة أ.د. طلال خليفة العبيدي + د. حسين تبينة
	الجلسة الافتتاحية Opening session		10: 20 AM	المحاضرين: Dr.PHAM DUC CANH فام دو كانه / شركة دونغ للالمنيوم المحدودة Dr.NGUYEN LINH CHI نجوين لينه شي / جامعة هانوي الوطنية Dr.PHAM THI THUY VAN فام ثي ثوي فان/ جامعة هانوي الوطنية
				أ.د. ماجد عبد العزيز عيسى الخواجة / الجامعة الاردنية
٧	توزيع الدروع والشهادات Distribution of shields and certificates		11: 00 AM	
٨	معرض براءات الاختراع / مشاريع التخرج ومعرض الفن التشكيلي Patents Exhibition / Graduation Projects and Fine Art Exhibition		11: 20 AM	
٩	Coffe break		11: 35 AM	

منهاج المؤتمر Conference platform

قاعة قرطبة - فندق المنصور ميليا /Cordoba Hall- Mansour Melia Hotel

السبت ٢٠٢٣/٥/٦ الساعة ١٢:١٥ م / Saturday 6/5/2023 at 12:15 PM

الجلسة الاولى	
رئيس الجلسة ا.د. احمد ياسين	مقرر الجلسة م.د. عبد الائمة بركة علي
اسم الباحث	عنوان البحث
ا.د مريم ما ل الله غزال بزون	أهمية البناء الفكري المستدام في تطوير الدراسات الإنسانية
ا.م.د زينب عبد الرزاق التغلبي المخطط كرار طعمة	تحديد مستويات التلوث الضوضائي للمولدات الكهربائية الأهلية في مدينة الكوفة "حي المتنبي انموذجا "
اهمية العلم في البناء المعرفي ودورها في التطور الفكري للمجتمعات	ا.م.د عمار باسم صالح ا.م.د.جاسم محمد حرجان ا.م.د.باسم محمد حسين ا.م.د.بلال نجم عبد الخالق
"ا.م.د حسين حسين زيدان خلف م.م هديل علي قاسم	المعوقات التي تواجه البحث العلمي المتخصص بدراسة مظاهر الفساد المالي والاداري في مؤسسات القطاع العام وفق رؤية استشرافية مستقبلية) (دراسة ميدانية)
ا.م .د رحاب كاظم رحيم ضاحي ضحى احمد محمد	Synthesis and characterization, DFT on study and Antibacterial activity of metal (II) Schiff base complexes
سلمى عبد الرحيم عبد الحسن داغر دهلة الشمري	الدراسات المستقبلية ودورها في تطوير التعليم العالي والبحث العلمي
أ.م.د.بيداء حافظ محمد حنظل الربيعي Iman Hammed Al-Anbari	Extract active compounds in sweet lupine seeds and study their effective antioxidant
م.م. هند عبد المجيد حمادي	التعليم مابين اهداف التنمية المستدامة وواقع العراق ... افاق واعدة
محمد ابراهيم مهدي	Transforming Education with Technology: A Roadmap for the Future
ا.م.د علي فاهم نعمة ادريس محمد ابراهيم مهدي	Transforming Education with Technology: A Roadmap for the Future
د.ايمان عباس محسن الربيعي فريال زياد طارق عصام عبد الرحيم عبد الواحد	Biodiversity and climate changes: A review
م.د أسراء عبد الكريم معروف أحمد Omar Mohammed Fawaz	The Effect of the Covid-19 Pandemic (Corona Virus) on HbA1c and Daily Sugar Levels on Diabetic Patients.
ا.م.د. سناء احمد كاظم علي Ass.Prof.Dr. Saad Abdual azize Adbdual Rahman	A New Approach for Audio Cryptography Based Hill and Affine Cipher

الجلسة الاولى	
رئيس الجلسة ا.د. احمد ياسين	مقرر الجلسة م.د. عبد الائمة بركة علي
اسم الباحث	عنوان البحث
ا. م رجاء جاسم محمد م.د. جمال كامل خضير	توظيف التكنولوجيا في اعداد منظومة تعليمية في مجال البحث والمعرفة
أ.د. ابتهال كاظم كريم حمزة Nadia Sadiq Majeed Hanan Faleh Mohsein Radhiyah Abdulbaqi Aldujaili	Preparation and Spectral identification of new complexes of some Transition metal ions (Bivalent) with Schiff- Mannich base ligands Derived from Isatin
م.د مصطفى محمد إبراهيم محمد م. م أحمد فالح عبد الرحيم	الاقتصاد العراقي بين تحديات مستقبلية واذعانات دولية للمده ٢٠٠٣-٢٠٢٢ بحث تحليلي
م.م محمد فرج حنون عوفي	تكنولوجيا المعلومات و دورها في تحسين الأداء الأكاديمي (دراسة ميدانية على عينة من الجامعات العراقية)
أ.د جمال باقر مطلك م.يقين كريم جمعة	استشراف مستقبل سوق السكن الجديد في مدينة الناصرية

منهاج المؤتمر Conference platform

قاعة الحمراء - فندق المنصور ميليا /Alhamraa Hall- Mansour Melia Hotel

السبت ٢٠٢٣/٥/٦ الساعة ١٢:١٥ م / Saturday 6/5/2023 at 12:15 PM

الجلسة الثانية	
رئيس الجلسة ا.د. نضال عبد الواحد علي	مقرر الجلسة م.د. موسى عبد الصاحب الاعرجي
اسم الباحث	عنوان البحث
م. خالد زيدان عبد الهادي إسماعيل	دور تقانة المعلومات في تحسين المسار الوظيفي / دراسة استطلاعية في مديرية بلدية الموصل
ا.م.د ابراهيم خليل حيدر مهدي	دور التطور التكنلوجى والمعرفي في البرنامج المحاسبية المؤتمته في أدوات الرقابه والتدقيق في المصارف التجاريه
ا.م.د أياد حميد حسن عليوي Abtisam Majeed Sarheed A.K Hussain	Effect of Supplementary Cementitious Materials on Durability Properties of Self Compacting Concrete
Dhekra Jawad Eman H. Al-Rikabi Angham G. Hadi	Chitosan; Commercial Production and Industrial Application
م.رائد شاكر حامد صالح Zaher Mohammed Abed Alsulaiei Prof.Dr. Haider Jabaur Abid Hawra Salah Hamid Ajimi	Estimation study of natural convection heat flow of ahorizontal tube via an electrical operator as the heat source
ا.م.د ورقاء محمود علي محمد	Biometric analysis of roots anomalies and root trunk dimensions in Iraqi populations
م.د علي جابر سعيد عذافة	استراتيجية تنمية الخدمات التعليمية واثرها في بناء وتطور المجتمع فكريا وعلميا قضاء الناصرية انموذجا
ا.م.د احمد عبد السلام احمد سالم أ.د. احمد محمود علو م.د. بكر محمود علو	ادارة راس المال البشري الإلكتروني واثرها في جودة التعليم الاهلي
أ.م.د.خالد عبد الكريم محمد عبد الله أ.د. عبد الرزاق جبر أ.د. عاشور حمود داوود	Estimation of heavy metal levels in serum and urine of athletes and non-athletes in Kamalia, east of Baghdad
م.م محسن رشيد محسن Bahaa Abdullah Laftaah AL-Rubaii	Antibiotic susceptibility profile related to Proteus mirabilis
أ.د. علي رحيم هادي الحلو	الإعجاز في لفظ (وكهلا) في آية (٤٦) من آل عمران، ونزول المسيح(ع) وانتمامه بالحجة(عج)
م.م احمد ابراهيم حسين علي	ادوات استشراف المستقبل و مؤشر الابداع العالمي لعام ٢٠٢٢ – نظرة اقتصادية

الجلسة الثانية	
رئيس الجلسة ا.د. نضال عبد الواحد علي	مقرر الجلسة م.د. موسى عبد الصاحب الاعرجي
اسم الباحث	عنوان البحث
ا.م.د وفاء شاكر عبد الكريم	اثر العلاج السلوكي المعرفي في خفض قلق المستقبل ادى طلبة الجامعة
Dr. Khalid M. Owaid علي كاظم سلمان عليوي	Effect of types of polymers on some characteristics of cement mortar
م. د صادق فاضل زغير الزهيري	اثر الثورة البيضاء على التعليم في إيران ١٩٦٣_١٩٧٣ (محو الأمية أنموذجا)
ا.م.د ماجدة حميد عبيد خزعل Huda S. Hassan Zeina A. Khalaf	Thermodynamic study of urea removal from polluted water byadsorption on two surfaces of fly-ash and zeolite

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م. د. هبة محمد حسين م. ابتسام اسماعيل حنا	دور أبعاد جودة الخدمة في التعليم الالكتروني/ دراسة ميدانية لآراء عينة من أعضاء الهيئة التدريسية في جامعة الحمدانية
م.م فاضل كاظم علاوي احمد	اثر استراتيجية التعليم المتألف في تحصيل طلاب الصف الاول المتوسط في مادة العلوم
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ا.م.د عمار مراد غركان حسن د. استبرق محمد حمزة	دور اليونسكو في حماية الممتلك الثقافي
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م.م زينب ثامر شهيد الباحثة ايمان عباس مهدي	حماية وسائل التواصل الإجتماعي من خلال قواعد الملكية الفكرية _ دراسة مقارنة
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رئيس الجلسة **أ.م.د. احمد طارق نعمان**	**مقرر الجلسة** **د. سامي غني عطرة**
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الفهرست

وزارة التعليم العالي والبحث العلمي

كلية المصطفى الجامعة

البحوث المشاركة في المؤتمر
(المحور الطبي)

ملاحظة : جميع البحوث خاضعة للاستلال الالكتروني

Life in Covid-19 time and Pandemic Fourth Wave

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Abstract: As I heard stories from my grandparents about the victims of diseases and epidemics they experienced in their lives, such as cholera, typhoid, malaria, and smallpox, I couldn't fully grasp the gravity of the situations they described. These were strange and painful tales about the toll these diseases took on people's lives. However, I now recognize the severity of what they went through and the challenges they faced.

In the present day, we are living through a period of time that can be likened to the experiences of previous generations. The COVID-19 pandemic, or the "Corona time," has had a significant impact on the world. In this article, we will examine the events that have occurred during this time.

Keywords: climate change; COVID-19 pandemic; World Health Organization; Corona virus.

1. Introduction

In my life, I do not remember a state of terror and panic in the world as the spread of the Corona virus caused, perhaps because we did not live in a time of epidemics, we did not know what the plague did, for example? What worries us the most is cancer, which some people do not dare to mention for fear and pessimism.

History will preserve that the Corona virus has changed the world more than wars, and even famines, and that this virus that initially invaded the Chinese city of Wuhan has become trans-geographical, defying the arrogance and tyranny of countries, and forcing the world to retreat, isolate and close its borders, and sometimes, perhaps, set the rules of democracy. In managing societies aside, resorting to emergency laws, and restricting public and personal liberties. History will remember that the Corona virus changed the world more than wars and famines

When the virus was announced in China, the belief was that it was a transient condition that would surround, and that the crisis of its damage would remain limited, and that China had to "plug its thorns with its own hands", and debates of a political nature ignited surrounded by conspiracy theory, according to which

this virus is "manufactured" and part of the struggle of the great powers, Or that it is a bacteriological invention and is inseparable from the race to develop bacteriological weapons close to the "action" series we watch in Hollywood.

The conspiracy theory fell quickly, and the virus emerged from the walls of China; the most powerful countries of the European continent fell into its clutches, and the world woke up to a danger that could not be ignored, or the doors were closed to it. Everyone rushes in search of solutions and safe havens from it. Preliminary estimates indicate the registration of nearly thousands of injuries and the death of thousands of people, and the increasing frequency of infection in Europe, especially and many countries of the world.

The Director of the World Health Organization called on the countries of the world to take more measures to confront the virus, stressing that the best way to avoid injuries and save lives is to break the chain of transmission through examination and isolation [1].

The seven countries considered the "Corona virus a human tragedy, a global health crisis, and great risks to the economy."

The golden rule that countries apply and clearly resort to is that the right to life and health takes precedence over all other rights, and that is why many countries were quick to quote the Chinese experience in closing disease hotspots, banning travel, and declaring a state of emergency, and even the curfew, despite criticism and reservations by human rights institutions against using exceptional measures to undermine human rights.

The world changed after the Corona virus, and the cities that were full of life became ghost cities, and people voluntarily chose to stick to their homes for fear of infection, that the virus deprived us of hugs and kisses for our children and love, and dinner with friends, no trips, no going out, no visits, no restaurants, no parties, no attending football matches and other popular events, a new and boring life devoid of fun, all of this greatly affected mental health. The first lesson coming from China to confront the virus is the speed of moving to discover and isolate infected cases, and in this way, the course of the disease can be changed and its accelerated growth stops until it begins to shrink, and effective containment is achieved, as happened in Wuhan [2-8]. The scenario followed by the countries of the world with isolation and quarantine to contain

the virus was not the scenario proposed by the British government, which promotes and adopts the "herd immunity" theory, which shocked society and the world for its distance from human sense, especially when Prime Minister Boris Johnson spoke about families who will lose their loved ones due to the Corona virus, And the government's scientific advisor, Patrick Valance, completed the rest of the scenario by talking about "acquiring immunity by infecting 60 percent of the British people," and this is understood, according to estimates, to sacrifice a million people for the rest of the people to live. The theory of "herd immunity" assumes that the more the epidemic spreads the more immunity broader patriotism for generations; despite the loss of life that may result. The COVID-19 pandemic has changed the world in this quick and unprecedented way of that organization at all levels: subnational, national and regional, international - Measures implemented by governments have a significant effect and profound impacts on national priorities and development plans [9]. Group Senior statisticians at regional, supranational and international level Organizations - Coordination Committee Statistical Activities (CCSA) - act fast, In the early stages of a pandemic, to support patriotism Statistical systems. CCSA International Offers Unified Statistical Review of Society The impact of the epidemic on economic and social aspects of Environmental development [10,11].

During this decade, the effects of climate change have become more apparent. Frequency and intensity of various meteorological events and their cascading effects from these events to the social and economic systems. It is also expressed in the most recent report of the Intergovernmental Panel on Climate Change [12]. The consequences of this discovery are widespread. These include ecosystems, particularly coastal, low-lying and Poor food and water security in many parts of the world [13]. This is because of the problem increased desertification and acidification of soil and water [14]; Vector diseases: Climate change also contributes to negative economic impacts. Loss of tourism activity and destruction of infrastructure and facilities Which supports various companies and institutions. These effects have been intensified at the community level, leading to forced migration [15], further loss of livelihood and loss of life is expected next decade.

The COVID-19 outbreak has 'taken by surprise' the global community According to Allam [16], most of the policies, procedures, and frameworks were

to contain the epidemic. Misplaced. As a result, Meyer et al. [17] Note that the pandemic has exposed vulnerabilities. Lack of flexibility in global supply chains. Especially supply chain networks They have shown an inability to respond effectively to unprecedented supply and demand. pressure. These pressures are combined with extraordinary demands and Consumption of medical supplies in different parts of the world. I was motivated too Through massive consumer demand driven by factors such as panic buying, Successive waves of epidemics restrict the movement of goods and people. global closure [18,19].

If the scientifically advanced countries are facing unprecedented challenges in dealing with the Corona pandemic, what is the condition of the poor countries, and what will the fragile countries do?

Fears, in light of the policy of secrecy, the lack of transparency and disclosure, and the weak health and medical management, that the world will be surprised by huge numbers of infected people in many developing countries if the epidemic leaks to its borders.

Life in the time of Corona is difficult and unbearable, so it is required that you voluntarily give up your freedom, change the rituals of your life, and isolate in anticipation of an imminent danger that may surprise you.

The battle is not over, despite the invention of a vaccine that saves people from perdition; Humanity is threatened, and the fear that the virus will kill you, or that those you love will reach an unlivable hell. The World Health Organization sounded the alarm that Europe and part of Central Asia – is again the "epicenter" of the covid pandemic as a fourth wave is about to engulf it.

Although I am not a psychologist or a doctor, after recovering from infection with the Corona virus 19, I found some advice that can help you, the most important of which are:

- Adapting to the situation and that continuing to complain and complain will not change it, and living in constant fear of infection will not help.
- Thinking positively is very important during this difficult period, so you must remember the positive things that happened during the day or in the past days. You should also stay away from the disturbing news and the news of

Corona completely, as well as stay away from the pessimists and strengthen the relationship from the optimists who raise the morale.

- Keeping the time for sleeping, waking up and working, even if it is inside the house, movement is necessary, whether walking or riding a bicycle, as well as taking advantage of the times of sunrise and movement in the open air relieves the mood of stress and worries with eating healthy food supported by fruits and vegetables.
- Starting something new and making life more beautiful. We often used the phrase “if I had more time, I would do this” and this time became available to learn a new language, for example, or to draw or social activity with others, or to sit with the children and help them.

Acknowledgments: The project was supported by Babylon.

Conflicts of Interest: The authors declare no conflict of interest.

Author Contributions: Investigation, writing—review and editing by Angham G. Hadi, all authors have read and agreed to the published version of the review.

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Comparison between apolipoproteins (A4, B, C3, E) in the ratio and effecting on lipid profile of type 2 diabetic patients in Kirkuk city, Iraq

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Abstract:

Background: Disturbances of the lipid metabolism in type 2 diabetes mellitus (T2DM), is essential in the rising of cardiovascular (CV) risk. Lipids and glucose play a crucial role in energy metabolism. It is well known that patients with diabetes often have dyslipidemia, which characterized by increased in the lipid profiles except HDL. The paper aims to investigate serum apolipoproteins and their effect on lipid profile of T2DM in a Kirkuk population.

Methods: The hospital-based cases- control study was conducted for patients with Type 2 diabetes patients that attended of the Diabetic center in K1 Hospital and Consultation Clinic of Kirkuk, and Azadi Teaching Hospital in Kirkuk during the period from March 2021– August 2021 were screened for serum concentration of apoA-IV, apoB, apoC-III, and apoE, lipids, lipoproteins especially in relation to (Exercise or physical activity, BMI, anthropometric measures (weight and height) from all patients were recorded. Type 2 diabetes with high lipid were cases and those without were controls.

Results: Among the Type 2 diabetes patients recruited for this study, serum lipid profile (total cholesterol, TG, LDL, VLDL) in T2DM patients was significantly higher than in control subjects, $p < .001$, while for HDL was not significantly different from control group, $p = .921$. The mean of APO-A4 of control (139.44± 63.75%), $p < .001$, was significantly larger than T2DM (70.12± 59.32%) in correlation to the level of lipid that indicate efficiency of APO-A4 on lipid profile including cholesterol and triglyceride in most of control groups and small amount of T2DM patients. APO_B mean for T2DM (142.49± 33.55) was significantly larger than for control (95.57± 7.70), $p < .001$, from bad lipoprotein, Which is elevated in most of diabetic patients associated with elevated LDL level and total cholesterol indication the bad effect on lipoproteins.

Conclusion: The findings of this study strengthen the fact that apoA4 is most effective apolipoprotien that play a major rule in maintain the level of cholesterol and triglyceride containing lipoprotein in normal state.

Keywords: apolipoproteins, type 2 diabetes, lipid profile

Introduction

Diabetes mellitus (DM) is the most common metabolic disorder affecting the people worldwide.[1] There are two primary forms of diabetes, type 1 diabetes mellitus (T1DM) and type 2 diabetes mellitus (T2DM). T2DM is the most common form of DM, which accounts for 90% to 95% of all diabetic patients.[2] Lipids, such as cholesterol, phospholipids, and triglycerides (TG), are insoluble in water. Therefore, their transport in the blood, lymph, and extracellular fluid requires association with proteins that have the capacity to interact with both lipids and water. These complex particles are lipoproteins that include (Chylomicrons, very low density lipoprotein VLDL, intermediate density lipoprotein IDL, low density lipoprotein LDL, and high density lipoprotein HDL).[3,4] In T2DM patients the most common pattern of dyslipidemia was hypertriglyceridemia, reduced HDL cholesterol levels, and an increased concentration of LDL particles. Dyslipidemia is one of the risk factors for vascular complications which is involved in T2DM due to insulin resistance and increased free fatty acid flux secondary to insulin resistance.[5] In the insulin-resistant state, hypertriglyceridemia may result from elevated free fatty acid levels and decreased degradation of apoB, leading to over-production of VLDL, impaired lipoprotein lipase activity, and decreased hepatic uptake of VLDL with reduced VLDL clearance.[6] Apolipoproteins are proteins that bind lipids to form lipoproteins. They transport lipids (and fat soluble vitamins) in blood. There are different types of these Apolipoprotien that include (apoA, apoB, apoC, apoD, and apoE), which are important for stabilize the structure of lipoproteins. Complex metabolic disorders of apolipoproteins are present in T2DM, such as high plasma ApoA4, apoB, apoC-III and apoE concentrations, which are associated with dyslipidemia and interrelated complications. [7, 8]

Patients and methods

This study was carried out in the registered attendances of the Diabetic center in K1 Hospital and Consultation Clinic of Kirkuk, and Azadi Teaching Hospital in Kirkuk during the period from March 2021– August 2021 A total of 150 subjects were screened for concentration of apoA-IV, apoB, apoC-III, and apoE (sunlongbiotech-china) by ELISA techniques according to manufactured instructions, 100 patients (70 females and 23 males) and 50 apparently healthy individuals. A complete

information include (Exercise or physical activity, BMI, from all patients were recorded. Serum concentrations of lipids, lipoproteins were assessed as a function of time since the last meal by using colorimetric method. Anthropometric measures (weight and height). Body Mass Index was used to assess the patient's body weight, BMI was calculated as WT in Kg /HT in (m) 2 (Jan A, 2021). Blood was collected by means of vein puncture with a sterile needle and syringe. Approximately five ml of venous blood was collected from each subject. The blood samples were centrifuged for 5 min. and serum were separated and stored in another plane tube at about (-20ºC) until assayed. With avoiding repetitive freezing and thawing of serum sample.

Statistical analysis

Statistical Package for Social Sciences version (SPSS) version 26.00 was used for data analysis, and the data are expressed as means ± standard deviation. Differences between study groups were evaluated by One-way analysis of variance (ANOVA) (Fisher's exact probability test) and chi-square test were used to analyze the association. P values less than 0.05 were considered statistically significant. Receiver operating characteristic curve (ROC) analysis was used to find out the best parameter.

Aims

This study was performed to evaluate the most effective apolipoprotien (apoA-IV, apoB, apoC-III, and apoE) on lipid profile in the patient with type2 diabetes mellitus.

Findings

Results in table (1) showed that were a significant variation in exercise or physical activity between the study groups $p < 0.05$. For both groups T2DM and controls, doing exercise or physical activity were the most frequently observation (n = 53, 53%) and (n = 50, 100%) respectively.

Table 1 Exercise or physical activity characteristics of the study groups

Variable	Groups	T2DM n (%)	Control n (%	Total	P
Exercise or physical activity	yes	53 (35%)	50 (33%)	103 (69%)	**0.001**
	no	47 (31%)	0 (0%)	47 (31%)	
	Total	100 (67%)	50 (33%)	150 (100%)	

Results for Testing the Relationships for Each Variable against group using Chi-square Tests, T2DM: type 2 diabetes mellitus, n: number, P: probability value, %: percentage.

Figure 1 represents the BMI of study groups that reveal an average of 30.00 ± 3.74 for T2DM had obesity. Where was significantly larger than that for control, with an average of 27.03 ± 2.84, $p<0.05$.

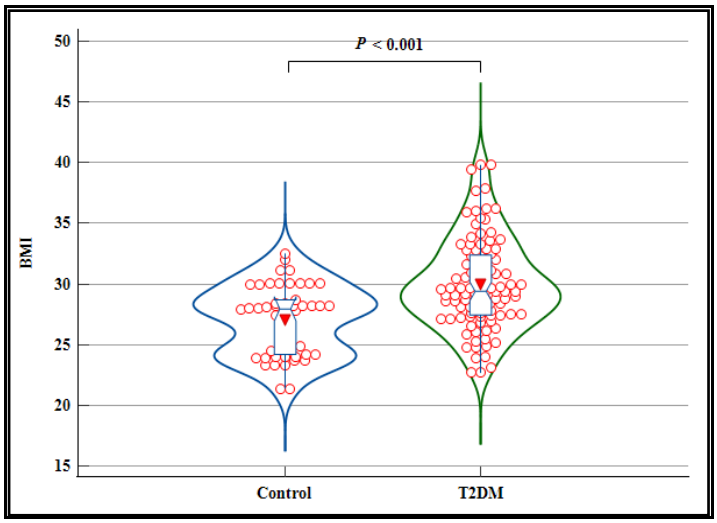

Figure 1 Violin & Boxplot comparing ranked values of BMI by the studied groups. The red small triangle in the middle is the mean values. The box presents interquartile range the horizontal line in the middle is the Median, whiskers are minimum and maximum values. The shape of the violin display frequencies of observations. p values computed using two-tailed Mann-Whitney *U* test.

It was revealed from table-2 that mean serum total cholesterol was 183.37± 82.24 in T2DM subjects was significantly larger than in control subjects 148.46± 16.28 mg/dl, t(109.91) = 4.03, p < .001. The mean of TG was significantly different between the T2DM and control categories of group, *t*(147.97) = 16.70, p < .001,. For T2DM, the TG had an average of 216.61 ± 51.80 which was significantly larger than that in control, 111.34 ± 25.41). The mean of HDL for T2DM 47.82 ± 10.25,). Was not significantly different from control group 47.99 ± 7.93, *t*(148) = -0.10, p = .921. The mean of LDL was significantly different between the T2DM and control categories of group *t*(143.18) = 9.77, p < .001,. For T2DM, the LDL had an average of 128.75 ± 46.83. This was larger than that in control, 76.13 ± 18.85. The mean of VLDL was significantly different between the T2DM and control categories of group, t(123.17) = 7.84, p < .001,. For T2DM, the VLDL had an average of 37.76 ± 18.22). Which was larger than that for control, 22.27 ± 5.08).

Table 2 lipid profile comparisons between the study groups

	control		T2DM		p
	Mean± SD	**SEM**	**Mean± SD**	**SEM**	
Cholesterol	148.46± 16.28	2.30	183.37± 82.24	8.35	< **0.001**
Triglycerides	111.34± 25.41	3.59	216.61± 51.80	5.18	< **0.001**
HDL	47.99± 7.93	1.12	47.82± 10.25	1.03	0.92
LDL	76.13± 18.85	2.67	128.75± 46.83	4.68	< **0.001**
VLDL	22.27± 5.08	0.72	37.76± 18.22	1.84	< **0.001**

P: probability value, SD: standard deviation, T2DM: type 2 diabetes mellitus, SEM: standard error, HDL: high density lipoprotein, LDL: low density lipoprotein, VLDL: very low density lipoprotein.

In this table three and figure 2 the mean of APO-A4 for T2DM (70.12± 59.32) was significantly smaller than for control (139.44± 63.75), $p < .001$. The mean of APO_B for T2DM (142.49± 33.55) was significantly larger than for control (95.57± 7.70), $p < .001$. The mean of APO_C3ng_ml for T2DM (51.11± 30.74) was significantly larger than for control (17.49± 4.26), $p < .001$. the mean of APO E for T2DM (24.59± 15.09) was significantly smaller than for control (38.01± 10.39), $p < .001$.

Table 3 Ratio between apolipoproteins (Apo A4, Apo B, Apo C3, Apo E) in study groups.

	control		T2DM		p
	Mean± SD	**SEM**	**Mean± SD**	**SEM**	
APO A4	139.44± 63.75	9.01	70.12± 59.32	5.93	< **0.001**

APO B	95.57± 7.70	1.09	142.49± 33.55	3.42	< **0.001**
APO C3	17.49± 4.26	0.60	51.11± 30.74	3.07	< **0.001**
APO E	38.01± 10.39	1.47	24.59± 15.09	1.51	< **0.001**

P: probability value, SD: standard deviation, T2DM: type 2 diabetes mellitus, SEM: standard error, APO A4: apolipoprotien A4, APO B: apolipoprotien B, APO C3: apolipoprotien C3, APO E: apolipoprotien E.

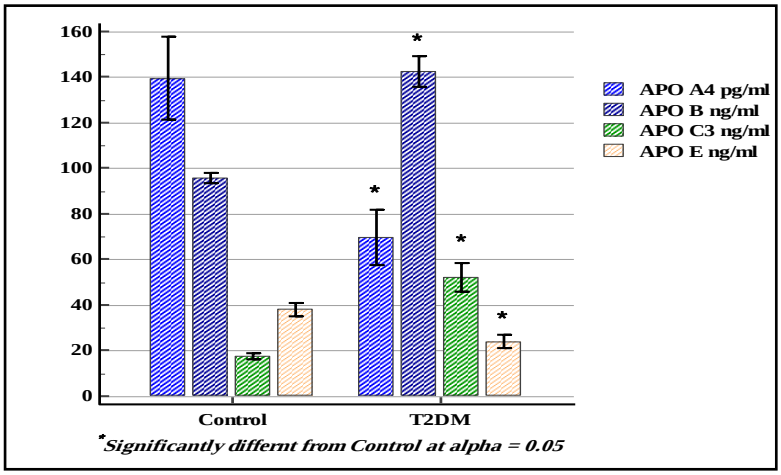

Figure 2 Ratio between apolipoproteins (Apo A4, Apo B, Apo C3, and Apo E) in study groups.

ROC curve analysis was conducted to test the ability of the apolipoproteins APO-A4, APO-B, APO-C3, and APO-E kits markers to discriminate diabetic patients from control in the present sample of the study cutoff was chosen depending on (sensitivity and specificity) of the test kits. It is obvious from figure 3, that Apo B had the highest area under curve AUC = 0.998 which indicate that APO B in comparison with other markers is the best marker in distinguishing diabetic patients from control group based on the present sample.

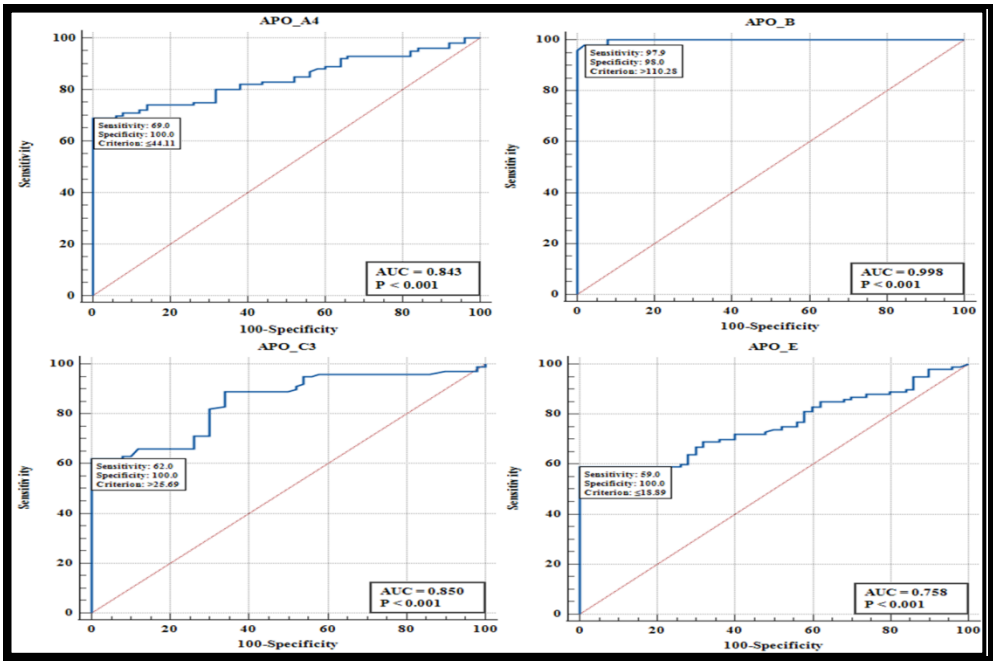

Figure 3 ROC analysis of APO A4, APO B, APO C3, APO E differentiating between T2DM and control, showing Sensitivity, specificity of the:

1- APO A4 at the point on the ROC curve corresponding to the maximum Youden index = 44.11 ng/ml
2- APO B at the point on the ROC curve corresponding to the maximum Youden index = 110.28 ng/ml
3- APO C3 at the point on the ROC curve corresponding to the maximum Youden index = 25.69 ng/ml
4- APO E at the at the point on the ROC curve corresponding to the maximum Youden index = 18.89 ng/ml

Discussions

This study determined the efficiency of apolipoproteins on lipids among type 2 diabetes patients and its implication in dyslipidemia diseases at Kirkuk city. This is one of several research published in Kirkuk that look into the topic of physical activity (PA) in diabetes patients, its correlates, and the reasons why they don't get the prescribed amount of PA. According to the findings, nearly two-thirds of the patients do not achieve the necessary level of PA. The findings given in this research can be utilized to identify people with type 2 diabetes who are not getting

enough physical activity. The significant variability of sources of PA counseling, along with the fact that nearly two-thirds of respondents received no PA counseling at all, is concerning, this in agreement with Zhuzenova *et al*, that find high prevalence of insufficient PA combined with poor counseling practices warrant intersectoral cooperation in the development of a strategy to improve PA among type 2 diabetes patients and general population in Kazakhstan. [10]

BMI in current research show, were higher in the T2DM patients compared to the normal group finding is consistent with other studies and suggests the role of obesity in the pathogenesis of T2DM. [11, 12] Obesity is linked to a variety of metabolic diseases and dysfunctions, including chronic low-grade inflammation and insulin resistance, all of which are causally linked to the development and progression of diabetes. Obesity has emerged as a major global public health issue, necessitating the implementation of intervention programs to address obesity in order to prevent DM.[13]

In our study serum total cholesterol was 82.24 % in T2DM subjects was significantly larger than in control subjects 16.28%, this is parallel to anther studies such as who find that the levels of high T-Chol, high Tg, and low HDL-C were more elevated among participants with T2DM, while the mean of HDL for T2DM was not significantly different from control group, in contrast to other finding for same study that show the levels of HDL-C was decreased in T2DM and did differ significantly between the groups.[14]

Hypertriglyceridemia was quite common; was seen in 51.80 percent of the T2DM patients in our study, which was significantly higher than the 25.41 percent in the control group. Almost half of the individuals saw a rise in their BMI. Other researchers have linked elevated triglyceride levels to diabetes and obesity's poor glycemic control. Improvement in glycemic management has been linked to a decrease in TG levels. The increase in triglycerides in poorly regulated individuals was linked to a decrease in activities as Dhoj *et al* documented. [15]

LDL and VLDL were significantly different between the T2DM with mean of 46.83%, 18.22% those were higher than that in control 18.85%, 7.84% respectively. This finding came in agree with other studies like Mondal *et al*, and Bhatt *et al* whose they got from their studies that diabetic patients with complication tend to have higher levels of lipid fractions (TAG, T. Chol, LDL and VLDL) and lower

level of HDL. [16, 17] And Ference *et al* have shown that VLDL particles pose equal atherogenic risk to LDL particles. [18]

According to ratio between the apolipoproteins (**ApoA4**, **APO B**, **APO C3**, **APO E**) in this study revealed that the mean of APO-A4 of control (139.44± 63.75%), $p < .001$, was significantly larger than T2DM (70.12± 59.32%) in correlation to the level of lipid that indicate efficiency of APO-A4 on lipid profile in most of control groups and small amount of T2DM patients in which most of subjects that have high apoA4 level have low lipid profile levels including cholesterol and triglyceride. This finding revel the positive effect of apoA4 high levels and in controlling the levels of lipid profile in the normal and acceptable levels. That consistent with other observation and studies as in Wang *et al* reported that apoA-IV has anti-oxidative and anti-inflammatory properties, and because it can mediate reverse-cholesterol transport, proposed functions of circulating apoA-IV have been related to protection from cardiovascular disease, intimately involved in metabolism. [19] Qu *et al* mention that apo A4 exhibits anti-atherogenic or anti-diabetic effect in the circulation and peripheral tissues. ApoA-IV is able to attenuate atherosclerosis probably through three different routes: (1) By affecting HDL-mediated reverse cholesterol transport; (2) by reducing LDL oxidation; (3) by suppressing inflammatory responses probably through P-selectin pathway and platelet aggregation via IIb3 integrin-mediated signaling. [7]

While the mean of APO_B for T2DM (142.49± 33.55) was significantly larger than for control (95.57± 7.70), $p < .001$, from bad lipoprotein, which is elevated in most of diabetic patients associated with elevated LDL level and total cholesterol indication the bad effect on lipoproteins in opposed to apoA4. Our finding came in agreement with Adaja *et al*, that documented an elevated apolipoprotien B-100 is a biochemical feature in poorly controlled diabetes mellitus, and there is a positive relationship between apolipoprotien B-100 and total cholesterol, LDL-cholesterol and non HDL-cholesterol. [20] And same like to mention of Behbodikhah *et al*, that a more recent discordance analysis of non-HDL-C versus apoB showed that apoB is the more accurate marker of cardiovascular risk, as apoB can identify elevated numbers of small cholesterol-depleted LDL particles that are neither identified by LDL-C or non-HDL-C. In addition, apoB is better as a target in patients with mild to moderate hypertriglyceridemia (175–880 mg/dL), diabetes, obesity or metabolic syndrome. [21]

The mean of APO_C3ng_ml for T2DM (51.11± 30.74) was significantly larger than for control (17.49± 4.26), $p < .001$. This is opposed to apoA4 that T2DM patients who counted any high apoA4 level had a low apoCIII level as well as decreased triglyceride level, which corresponds to the study of Borén *et al*, that an increased plasma level of apoC-III in states associated with insulin resistance has been implicated as a key driver of the hypertriglyceridemia commonly found in people with this condition. [22] Documentation of Mauger *et al*, also consistent with our finding in which total plasma apoC-III levels have been identified as a major determinant of triglyceridemia, and apoC-III comprise inhibition of lipoprotein lipase (LPL) activity, disruption of the interaction of TRLs with vessel wall heparan sulfate proteoglycans, and lower clearance of apoB-containing lipoproteins by LDL and LDL-related receptors. [23]

The mean of APO E significantly differed between study groups which higher in control than T2DM patients, beside to apo A4 apoE can also have benefit effect on lipid metabolism that consist with Michael C. documentation where he mentioned apo E is a 299-residue protein which functions as a key regulator of plasma lipid levels. Especially apoE3 isoforms operates optimally in promoting clearance of triglyceride- rich lipoproteins and is associated with normal plasma lipid levels. [24] As in our study found that elevation apoE level in the control group associated with normal lipid levels but however, despite to the presence of small percentage of T2DM patients with relatively high apoE level, it's nevertheless not commensurate with low lipids (cholesterol and triglyceride) as observed with high levels of apoA4 this confirms our conclusion in current research that apoA4 is the best type in affecting on lipid profile than other types of apolipoproteins.

ROC curve analysis was conducted to test the ability of the apolipoproteins APO-A4, APO-B, APO-C3, and APO-E markers kits to discriminate diabetic patients from control in the present sample of the study, It is obvious from figure 3, that Apo B had the highest area under curve AUC = 0.998 and 97.0% sensitivity and 98.0% Specifity which indicate that APO B in comparison with other markers is the best marker in distinguishing diabetic patients from control group based on the present sample.

Conclusion

T2DM patients in this study had elevated levels of TAG, TC with slightly elevated levels of LDL-C and with slightly reduced levels of HDL-C. This indicates the influence of T2DM on abnormal lipid profile of patients with its associated danger of elevated CVD risk. The findings of this study strengthen the fact that apo A4 is most effective apolipoprotien that play a major rule in maintain the level of cholesterol and triglyceride containing lipoprotein in normal state. ApoB elevated in most of diabetic patients associated with elevated LDL level and total cholesterol indication the bad effect on lipoproteins in opposed to apoA4. Apo B had the highest area under curve in ROC analysis which indicates that APO B in comparison with other markers is the best marker in distinguishing diabetic patients from control group based on the present sample.

Ethical approval: Ethical approval for this study was granted from ethical Committee the Iraqi Ministry of Health (no. 12961)

Conflicts of interest: The authors have no conflict of interest to declare.

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Immunological evaluation of asthma patients in Thi-Qar province

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Abstract

Inflammation and constriction of the respiratory passageways cause the chronic condition known as asthma, which affects the lungs' airways. This limits airflow to the airways. Being exposed to toxins by inhalation causes recurrent attacks of shortness of breath with wheezing, coughing, and phlegm. One of the most prevalent illnesses among children is allergies or respiratory system irritation, and these seizures differ from person to person in terms of strength and frequency.

The study aimed to know the economic and social situation of asthma patients and what role it plays in assessing their condition.

How to Use This Template

Data and information for 100 patients were collected through outpatient clinics, where data and data were classified according to the results of the study to 8 parameters.

Introduction

Asthma is now more prevalent than it was decades ago in the developed world. In any case, a portion of this expansion is real rather than the result of modifications to symptomatic practices. There must be some natural or societal element causing this growth in hereditarily stable populations. Given that asthma is becoming more prevalent in westernized and wealthy countries, it is possible that asthma is a disease of affluence based on these countries' increasing prevalence of the condition. Numerous attempts have been made within countries to link the prevalence of asthma and atopy to economic status (SES). Unlike atopy, which becomes more prevalent in higher SES groups. The evidence on financial design in asthma is contradictory. While other studies have found no correlation, some have found both increased and decreased asthma prevalence in higher SES groups. There may be some explanations for these discoveries, including the investigational methodology. It may be misleading to use symptoms like wheezing and coughing to indicate asthma. This might be a direct result of the event of non-asthmatic wheeze and hack (because of bronchitis, for instance) or due to contrasts in announcing these side effects between financial gatherings. On the other hand, a doctor's diagnosis and course

of action for asthma may differ depending on the amount of money involved, leading to either a definite increase in prevalence in people with greater access to mental health or a definite increase in asthma severity in those with inadequate care .

Literature & Review

Asthma is among the major ailments that significantly impact air travel. The sickness causes the lung's air supply to be constrained and inflamed. Intermittent bouts or indications of asthmatic side effects include chest tightness, wheezing, shortness of breath, and hacking. Asthma worsens, causing the airways to enlarge and become extremely sensitive to specific chemicals that people may breathe in. When this enhanced affectability causes a response, the muscles that control aviation routes tense up. They run the danger of significantly limiting air travel and inducing an excessive amount of mucus formation by doing this. Severe asthma attack symptoms could be caused by the confluence of triggering respiratory events. Asthma claims the lives of about 250,000 people annually. Asthma attacks happen when symptoms are at their worst. They might start unexpectedly and range in severity from minor to significant. Some asthma episodes can totally block oxygen from entering the lungs, which also stops it from entering the circulatory system and essential organs. The airways' swelling is to blame for this. Such a severe asthma attack demands rapid attention. The airways allow enough air to enter the lungs during the start of an asthma attack, but they don't allow carbon dioxide to exit the lungs quickly enough. If the body does not expel carbon dioxide, it becomes poisonous, and a protracted asthma attack may cause the gas to accumulate in the lungs. Moreover, this may reduce the amount of oxygen that enters the cardiovascular system. Those who have asthma with obvious symptoms should see a doctor. They will provide drugs and advice on how to use them, as well as training on how to identify potential triggers for asthma side effects and how to avoid them. Also, the specialist will recommend medications to assist reduce the frequency of asthma attacks. Enforcing asthma control lowers the condition's impact on daily life .

Types of asthma:

There are many different types of asthma, separated by age and severity, and the same number of diverse factors contribute to its occurrence. Airborne toxins,

form, mold, and cigarette smoke are some examples of triggers that are identical in adults and children and cause an adversely susceptible reaction in flight routes.

-١ Children asthma

Youngsters will undoubtedly develop an intermittent form of asthma that manifests as severe attacks. Some children may experience common side effects, but an increased susceptibility to triggers is the typical hallmark of asthmatic children. For children with asthma, secondhand smoke is quite problematic. According to the American Lung Association, second-hand smoke causes asthma symptoms in between 400,000 and 1 million children to worsen. According to the Centers for Disease Control and Prevention (CDC), children encounter more emergency room visits and asthma diagnosis confirmations than adults. In young people, mild asthma may go away on its own. Nonetheless, if symptoms are moderate or severe, there is still a chance that the problem will recur in the future.

-٢ Grown-up beginning asthma

Adult-onset asthma requires daily management of flare-ups and avoidance of adverse effects because it is typically persistent. Any age can be the onset of asthma. At least 30% of newly diagnosed cases of asthma in adults are caused by hypersensitivity. Women are inevitably going to get asthma beyond the age of 20, as corpulence is a significant risk factor for adult-onset asthma. Asthma affects countless people over the age of 65.

-٣ Word related asthma

This particular type of asthma manifests right away as a result of a calling or profession. In the wake of entering a certain working setting, side effects will become visible. Preparation, facility work at research facilities, or assembly are all businesses with a regular connection to asthma. In this case, a child's first asthma attack or a mature person's first asthma attack is brought on by the workplace. Runny and red eyes could be additional symptoms.

Causes

Asthma severity might vary depending on a person's complete domain and hereditary traits. Asthma is the most well-known chronic disease that affects kids. The primary symptoms become visible in children around the age of five through wheezing and routine respiratory tract infections. The primary causes of asthma will then be covered.

-١ Hypersensitivities

Hypersensitivities and asthma are closely related. One study published in the Annals of Asthma, Allergy, and Immunology in 2013 suggests that more than 65 percent of adults with asthma over the age of 55 also have a hypersensitivity, and the percentage is closer to 75 percent for those between the ages of 20 and 40. Animal proteins, typically from cat and dog hair, dust mites, cockroaches, and fungi are some common sources of indoor allergies.

-٢ Smoking tobacco

According to studies, smoking increases the risk of developing respiratory illnesses like asthma, wheezing, and other breathing problems, as well as dying from them. Similarly, there is an increased risk of asthma in children whose parents smoke. By exacerbating the side effects of asthma, such as hacking and windedness, as well as increasing the risk of contamination from excessive mucus production, smoking worsens the effects of asthma on air travel.

-٣ Natural variables

Air pollution in the entire house might impact asthma development and triggers. Due to indoor air pollution from mold or toxic exhaust from household cleaners and paints, hypersensitive reactions and asthmatic side effects frequently occur.

-٤ Heftiness

Even though the American Academy of Asthma, Allergy, and Immunology does not view weight as a recognized risk factor for asthma, certain studies, like this one from 2014, suggest a link between obesity and asthma. Yet, the data being discussed suggests a relationship between fat and the inflammatory factors that cause asthma .

-٥ Pregnancy

If a woman smokes cigarettes or uses illicit drugs while she is pregnant, the unborn child may get smaller in the womb, have difficulties working and giving birth, and have a low birth weight. These infants may develop an increasing propensity for medical conditions, such as asthma.

-٦ Stress

The prevalence of asthma is increased in people who suffer pressure. These higher rates may be explained by increases in asthmatic behaviors during stressful situations, such as smoking. Asthma attacks can be brought on by enthusiastic reactions, such as laughing and sadness .

-٧ Hereditary qualities

Asthma can be transmitted from a parent to their child. There is a 25% chance that a child may develop asthma if one parent does. Having two asthmatic parents raises the risk to 50%. Asthma inheritance is linked to a variety of traits. Although confirming these discoveries may call for additional investigation, these attributes can interact with the earth to become dynamic .

-٨ Atopy

Atopy is an all-encompassing category of negatively responsive excessive touchiness that causes hypersensitivity reactions in numerous body parts even when there is no contact with an allergen. Roughage fever, hypersensitivity conjunctivitis, and skin irritation are all included in the models. Because common allergens cause atopy, the body produces more immunoglobin (IgE) antibodies than is normal. Atopy has a significant role in the development of atopic asthma, the type of asthma that is most well-known. Environmental allergens cause an excess of IgE antibodies to be produced and set off asthmatic attacks.

-٩ Determination

A precise diagnosis of asthma is dependent on three key factors: the patient's medical history, the examiner's impressions during the examination, and the results of breathing tests. In addition to identifying the kind of asthma, an important aspect doctor will supervise these tests and determine whether a patient has mild, irregular, moderate, or severe asthma. A professional can determine with accuracy the precise family history of asthma and allergies. The same number of provide components with asthma increase the risk, so it's important to consider a personal history of sensitivity. To assist in managing medication, keep track of any potential triggers for asthma side effects, including information about any potential occupational aggravations. Be certain to understand

١. A stuffy nose

٢. A sinus infection

٣. Reflux of acid

٤. Emotional strain

٥. Slumber apnea

Children under the age of 5 who develop asthma symptoms believe it becomes increasingly difficult to obtain a clear diagnosis. Experts may confuse asthma symptoms for those of other childhood illnesses. If children encounter wheezing episodes during colds other respiratory illnesses in their early years, they are likely to develop asthma after the age of six.

Additional indoor asthma triggers and symptoms include:

- pollution
- Sulfide dioxide
- Oxygen monoxide
- Ozone
- freezing temperatures
- Extreme stickiness

In general, excessive air pollution will cause an increase in the frequency of asthma symptoms and clinic confirmations. Hacking, shortness of breath, and even chest pain are brought on by the destructive gas known as ozone that is released in smoggy circumstances. These similar circumstances emit sulfur dioxide, which clogs airways and causes asthma attacks. Assaults may also be sparked by changes in the weather. Cold air can cause blocked or constricted airways, more body fluid discharges, and a reduced ability to remove those bodily fluids. In some places, humidity can also make it difficult for people to breathe.

Diagnosis

١- Physical test

A physical examination will primarily focus on the skin, chest, and upper respiratory system. With the aid of a stethoscope, a doctor will listen for signs of wheezing or a loud whistle when exhaling in the lungs. An important sign of both an impeded aviation system is wheezing .

Route and asthma. Doctors will likewise check for a runny nose, swollen nasal Asthma, and travel. Along with looking for a runny nose, swollen nasal passages, and delicate nasal growths, doctors will also look for hives and dermatitis, two skin disorders. These are adversely vulnerable situations that are linked to asthma and advise heightened protective activity that may be the cause of any wheeze. It is possible to have asthma without presenting any physical symptoms during an examination, as people with asthma don't typically show any physical side effects.

٢- Asthma tests

Another component of diagnosing asthma is performing lung function testing. They evaluate how quickly someone can expel air from their lungs as well as how much air they take in and exhale. The results of a spirometry test can indicate lung function.

Fig: Show a spirometry

-٣ A spirometry can help assess lung function.

In order to do the non-intrusive test of spirometry, you must take deep breaths and forcefully exhale into a hose. The hose is attached to a device known as a spirometer, which displays two important estimates :

- Forced fundamental limit (FVC), or the maximum amount of air that a person may inhale and exhale.
- Forced expiratory volume (FEV-1), is the maximum amount of air a person can exhale in a single breath.

The professional then considers these estimates in comparison to what could be typical for someone else a comparable age. Estimates that are below average depict flight paths that are discouraged and plausible asthma. Before conducting another spirometer test to confirm the result, a specialist will typically administer a bronchodilator drug to the affected areas. The likelihood of an asthma analysis rises if results improve after using the drug. While it is difficult to use spirometry to examine children under the age of five, the majority of asthma diagnosis relies on symptoms, treatment histories, and other aspects of the physical examination. For 4 to approximately a month and a half in younger children, doctors frequently recommend asthma medications to monitor physical development .

Materials and methods

-١ Collection data

Data and information for 100 patients were collected through outpatient clinics, where data and data were classified according to the results of the study to 8 parameters.

-٢ Statistical analysis

Results were given as the mean minus the standard error of the mean (SEM). At the threshold of P0.05, differences were deemed significant. Using SPSS, 2010 was used for all statistical analysis (SAS Institute, Inc., USA .(

Results

-١ Patient age group

The findings of the present investigation revealed that the prevalence of asthma in various ages was an infected of the age of five years to the age of more than 18 years, with the highest rate of infection at the age of more than 18 years as shown in the Fig. 1

-٢ Patient sex

The findings of the present investigation revealed that the prevalence of asthma varied by sex. (Female and male) was an infected with the highest rate of infection at the female of more than male as shown in the Fig. 2

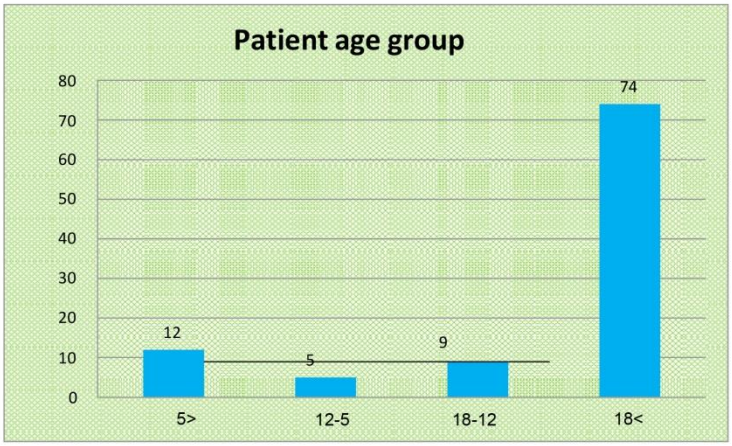

Fig 1

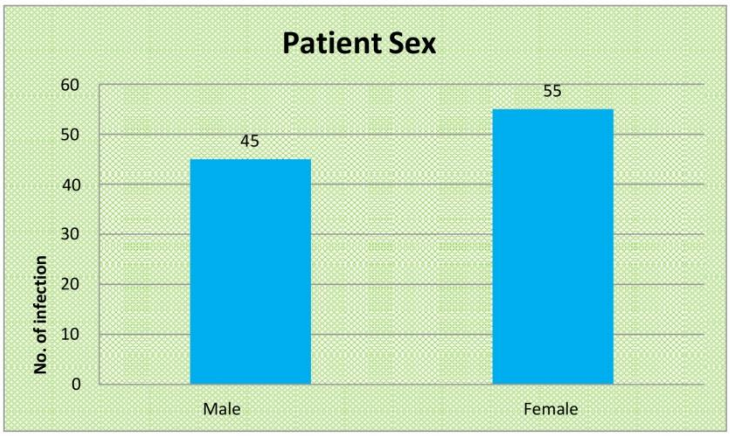

Fig 2

3-Patient birth place

The findings of the present investigation revealed that the prevalence of asthma varied by patient's location of birth. Was an infected with the highest rate of infection at the urban of more than rural as shown in the Fig.3

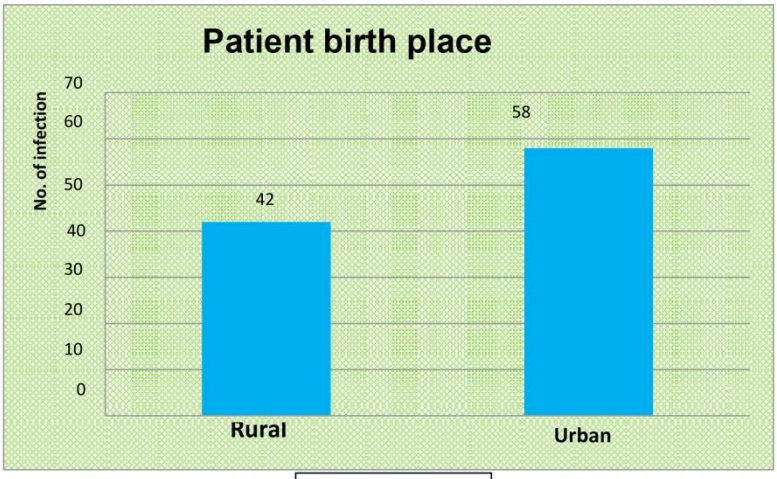

Fig 3

4-Patient marital status

The findings of this study demonstrated that the prevalence of asthma varied by patient marital status. Was an infected with the highest rate of infection at married of more than single and then widowed and last separated as shown in the Fig

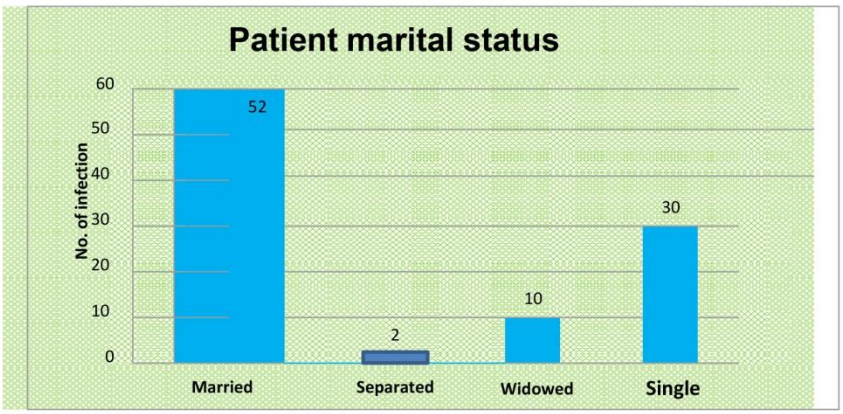

Fig 4

5-Patient education

The findings of the present investigation revealed that the prevalence of asthma in various **Patient education** was an infected with the highest rate of infection at the CS or less of more than CUC and then UN and last the SUC as shown in the Fig. 5

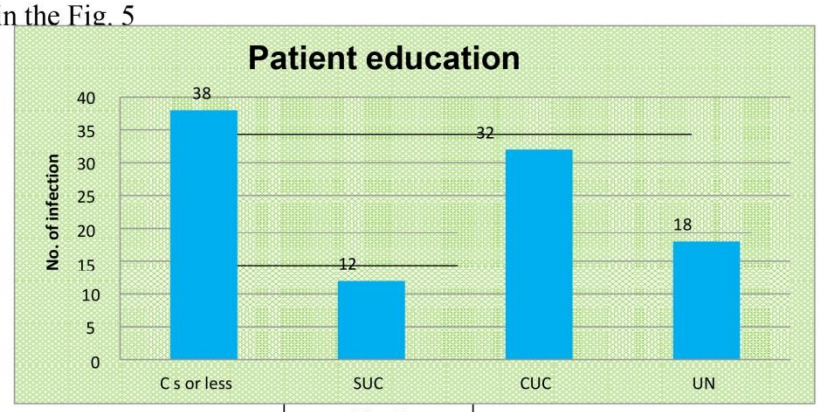

Fig 5

6-Income adequacy

The findings of the current study revealed that the prevalence of asthma varied with income sufficiency. Was an infected with the highest rate of infection at the medium of more than low and then high as shown in the Fig. 6

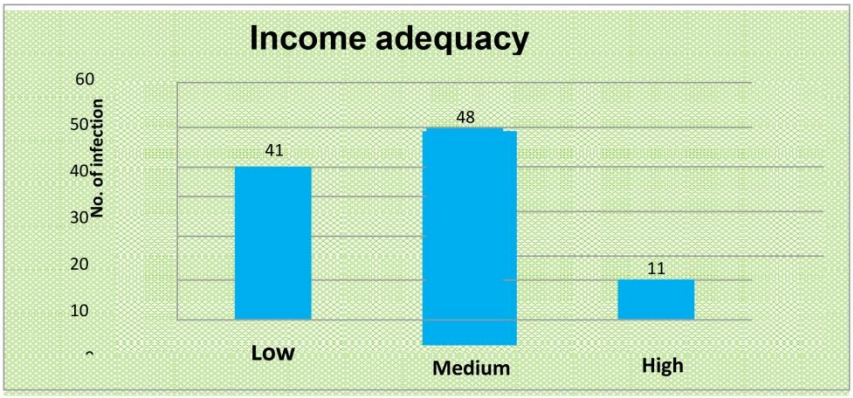

Fig 6

7-Drug plan supplier

The findings of the present investigation revealed that the prevalence of asthma in various Drug Plan Supplier was an infected with the highest rate of infection at the employer or private of more than public or government and then no drug plan as shown in the Fig. 7

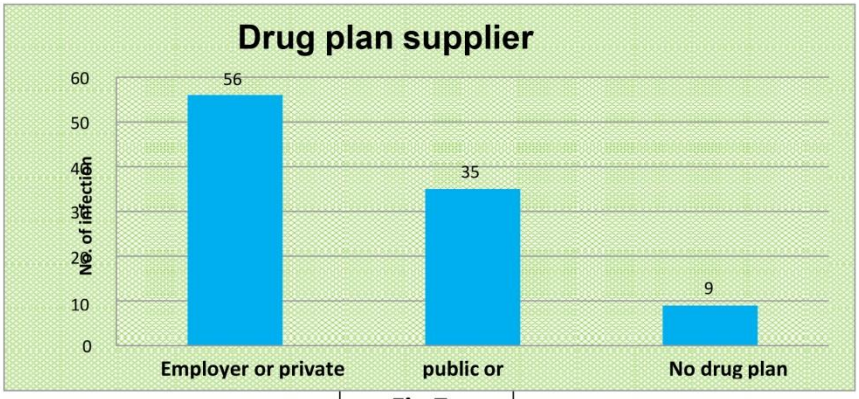

Fig 7

-٨Duration of asthma

The results of the current study showed that the incidence of asthma in different Duration of asthma was an infected with the highest rate of infection at the < 60 months and > 216 of more than 72-204 as shown in the Fig. 8

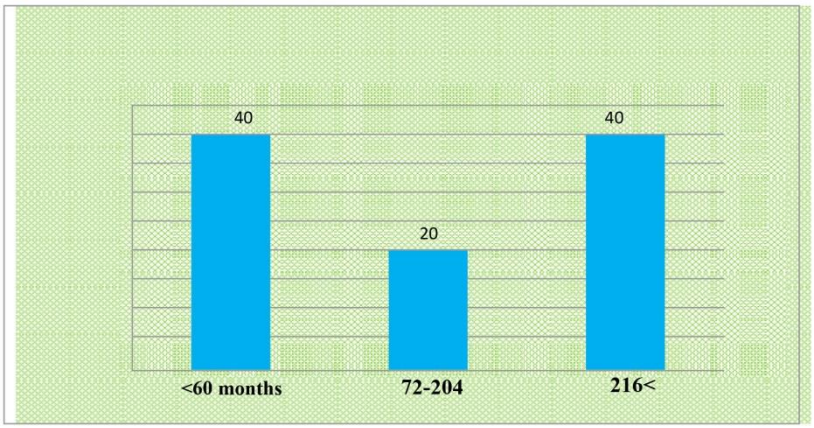

Fig 8

-٩ Percent of income spent out of pocket on patient asthma medication

The findings of the present investigation revealed that the prevalence of asthma has increased in different Percent of income spent out of pocket on patient asthma medication was an infected With the highest rate of infection at the >3% of more than 1-3% and then 0-1% and 0% as shown in the Fig. 9

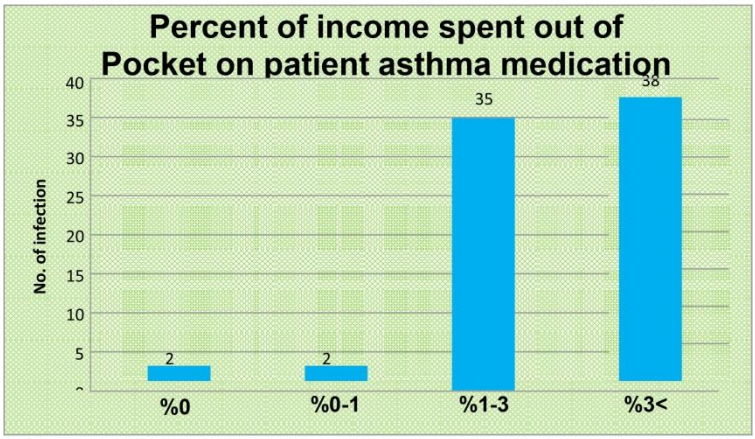

Fig 9

Discussion

This study found a connection between asthma and age, as well as between sex of the patient, recall of the parameter, and SES at any age, from early childhood through early adulthood. The findings were true whether we used parental employment or parental income as a measure of adolescent SES. Moreover, adult SES had no impact on adult asthma, and the diagnosis of asthma in children had no impact on adult SES or instructional success. Our findings on asthma diverge from those for other medical conditions in this partner where significantly worse adult wellbeing occurred in people who experienced childhood in a low SES background. In 46, there was a significant trend toward increased atopy with higher.

Identify any notable correlation between serum IgE and SES. This analysis focuses on some of the problems that prevent the successful application of earlier research. In order to check for a consistent association between SES and asthma at different ages, we have initially collected information speculatively from early adolescence through early adulthood. Also, goal proportions of lung capacity and aircraft route responsiveness were carried out together with emotional proportions of asthma, such as symptoms, professional judgment, and therapy. By focusing on the specifics of the side effects, contrasting demonstrative practices, or gaining access to the mind, we may thereby avoid

blatant differences in the prevalence of asthma. Third, detailed data on confounders that were mentioned and potentially confounding factors, such as smoking during pregnancy, parental asthma, and parental smoking (indicating likelihood.(

Our scientific results' broad applicability too many populations is unclear. The findings might not have an impact on social orders if social conditions differ noticeably, similar to any examination into social conditions and wellbeing.

The extent and character of financial discrepancies may be different or more obvious in other nations, despite the fact that the Dunedin accomplice speaks to the whole financial spectrum of New Zealand. Moreover, problems related SES to asthma may vary throughout different countries. Poor lodging, for instance, may expose children to higher levels of the allergen cockroach in the USA. Compared to sensitivity to house dust vermin, cockroach hypersensitivity was less common in this companion (unpublished). In a place like Dunedin, for instance, an introduction to house dust bug will likely be comprehensive. All things considered, we believe that our analysis is the most extensive examination of the relationship between asthma and financial problems to date. Overview data from various countries .

Conclusions

١.Effective asthma treatment requires routinely tracking your symptoms and measuring how well your lungs are working. Taking an active role in managing your asthma treatment will help you maintain better long-term asthma management and prevent asthma attacks and avoid long-term problems an immune disease that is dangerous if left unattended or treated.

٢-It can lead to serious systemic diseases such as heart disease

Recommendations

١. Keep an eye on your signs

٢. Keep a daily journal of your asthma symptoms. By keeping a record of your symptoms, you can determine when your asthma action plan requires you to change your therapy. Use a note for asthma.

٣. Monitoring the functionality of your lungs.

Periodically, your doctor may keep track of the outcomes of lung function tests that involve breathing. Your asthma may not be under control if your lungs aren't functioning properly.

٤. Modify your treatment in line with your asthma control strategy .

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Phylogenetic Tree of *Staphylococcus aureus* Isolated from Meats

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Abatract:

Background:*Staphylococcus aureus* is one of the most widely associated with food burn diseases in the world. *S. aureus* has involved in several outbreaks, and *S. aureus* food poisoning has been reported in several countries and related to a wide range of foods.

Methods: 500 samples of meat were randomly selected from several butcher shops and supermarkets in AL-Hilla city, Iraq. The *16SrRNA* (465 bp) F-CTACGGGAGGCAGCAG , R- AGAT ACCCTGGTAGTCC (Mori *et al*., 2014) used to study the phylogenetic tree of *S.aureus* isolates. The solved PCR amplicons were forward and reverse sequenced commercially in accordance with the instructions provided by the sequence company. The neighbor-joining protocol was used to construct a specific comprehensive tree.

Results: The prevalent of *S.aureus* isolates was 30 from 500 meat samples identification by culture, biochemical and genetic (*16SrRNA* gene). A comprehensive phylogenetic tree entailed the presence of only one genus, Staphylococcus, were clustered into two clades. The first clade a major clade observed C44G in making such a unique phylogenetic position for samples having this variant. The second clad vicinity to the many deposited *S. aureus* samples, including the GenBank accession number of CP053353.1 and BX571856.1, which related to American and English strains of *S. aureus* respectively.

Conclusion: The *s. aureus* contamination of meat samples and the genetic method are considered the golden method for identification of bacteria and to study the phylogenetic tree**.**

Key words: neighbor-joining, meat, SNP,sequencing,PCR

Introduction

Staphylococcus aureus is one of the most widely associated with food burn diseases in the world. *S. aureus* has involved in several outbreaks, and *S. aureus*

food poisoning has been reported in several countries and related to a wide range of foods. For thousands of years, FBDs has been a question of considerable concern, and scientific knowledge of food safety could be the origin of ancient laws on clean and unclean food. Consumer research in rich and poor countries currently shows a high level of concern about food safety [1].

Kuroda *et al*., 2001 first reported complete -genome sequence of *S. aureus* in 2001. The *S. aureus* genome has 2,800 genes and about 2.8 Mb [2]. The genome of *S.aureus* cosist from three region the first core genome, second, variable core genome (VCG), and thconsistse mobile genetic elements (MGEs) is distinguishable in *S. aureus* genome, all isolates of this species (>97%) the core genome is strongly conserved and constitutes 75% of the genome correlated with the housekeeping genes. The VCG comprises 10% of the genome and varies between isolates due to the presence/absence of genes or gene polymorphisms [2, 3].

Sequencing of DNA is the method used to calculated nucleic acid sequence and the nucleotide order in DNA. It comprises some procedure or process for evaluating the 4 bases: adenine, guanine, cytosine and thymine[4].

The main typing technique of microbiology laboratories can be entirely genome sequencing, replacing all other typing techniques because of lower cost of materials and equipment [4]. It offers the highest resolution for phylogenetic analysis and assessing inter-strain similarity, and it can generate data on antigenic diversity, virulence, and antibiotic resistance, forecasting intriguing traits [5].

Sequencing results are made up of tens of thousands of readings of genomic DNA fragments, the majority of which have less than 400 base pairs [6]. To reconstruct the genome sequence, the reads must be assembled. There are two options: A method known as mapping-based assembly involves comparing the sequences to those of a reference strain, or de novo assembly, in which the reads

are assembled in larger regions known as contigs that must be further assembled. However, this does not always result in complete coverage [7, 8]. The research was aimed to isolate, identification and study the phylogenetic tree of *S.aureus* isolated from meat samples.

Materials and Methods

Collection of Samples

Using a sterile container, 500 samples of meat were randomly selected from several butcher shops and supermarkets in AL-Hilla city, Iraq. On the mannitol salt agar, a loop of meat suspension was streaking and incubated for 24 hours at 37 °C [9].

Polymerase Chain Reaction

The *16SrRNA* (465 bp) F- CTACGGGAGGCAGCAG , R- AGAT ACCCTGGTAGTCC [10] used to study the phylogenetic tree of *S.aureus* isolates. The oligonucleotide primers were provided by Bioneer (Korea). To create several copies of a gene, a polymerase chain reaction is used. The reaction mixture is used to rapidly heat and cool the tubes during PCR on an automated cycler. PCR was carried out in 35 cycles in three key steps: Denaturation, annealing, and extension [11].

The PCR product was confirmed by agarose gel electrophoresis [12]. The electrophoresis results detected by using a gel documentation system. The base pair of the DNA measured according to the ladder. UV transilluminator used to analyze DNA bands, and a digital camera used to photograph gel [11].

DNA Sequencing

The solved PCR amplicons were forward and reverse sequenced commercially in accordance with the instructions provided by the sequence company (South Korea). To make sure that annotation and discrepancies are not

related to PCR or sequencing objects, only consistent chromatographs from ABI sequence files were further examined. By contrasting the observed nucleic acid sequences of local samples with the reference sequences from the bacterial database, virtual locations and other characteristics of the PCR fragments were identified.

Analysis of Sequencing Data

As long as the corresponding sequences in the reference database are used by the program version 7.1 of the BioEdit Sequence Editor, the sequence of PCR products from distinct samples has been edited, synced, and analyzed. (DNASTAR, Madison, WI, USA). The detected changes in each sequenced sample were listed along with their corresponding positions in the reference genome and in PCR amplicons.

Comprehensive Phylogenetic Tree Construction

A particular comprehensive tree was built according to the neighbor-joining protocol defined by Sarhan *et al* . [13]. The variants observed were compared to their next homologous sequences with the NCBI-BLASTn .server [14]. The neighboring method developed a full inclusive tree, including the selected variant and visualized with iTOL suit, which generates a circular cladogram [15]. The sequences in the complete tree were annotated accordingly for every classified phylogenetic species group.

Results

The result of culture, Biochemical, and genetic showed the percentage of *S.aureus* isolates was 30 from 500 meat samples identification by culture, biochemical and genetic (*16SrRNA* gene). To study phylogenetic tree of 30 *S.aureus* isolates in this study from meat, The PCR done by using *16Sr RNA* (465 bp amplicons). It was ensured that all of the amplified amplicons had produced distinct, clear bands before sending them for sequencing Figure (١) .

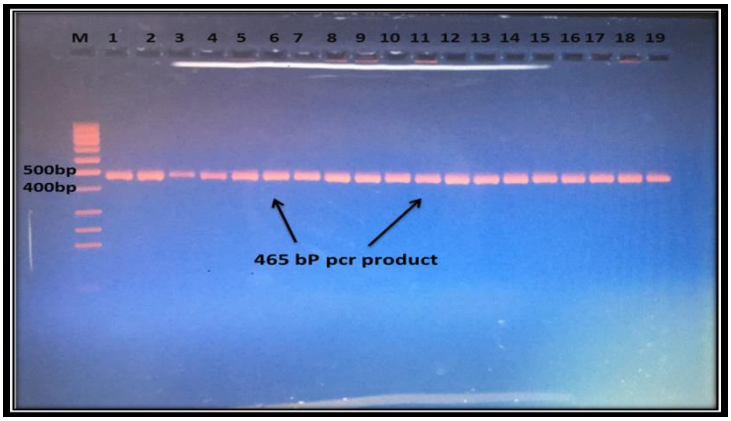

Figure (1): Agarose gel electrophoresis to *16SrRNA* gene product (amplified size 465 bp) stained with ethidium bromide showed positive samples

The sequencing reactions confirmed the identity of the amplified products by using NCBI blastn. The NCBI BLASTn engine found high sequence similarities between the sequenced samples and *S. aureus* sequences for the 465 bp PCR amplicons of the currently targeted ribosomal sequence. The NCBI BLASTn engine found approximately 99% homology with the expected target, which covered a portion of the *16S rRNA*. This gene is critical for correctly identifying the bacterial species under investigation. By contrasting the observed DNA sequences of the samples under investigation with the retrieved DNA sequences (GenBank acc. CP062279.1), the precise locations and other characteristics of the retrieved PCR fragments were determined (Figure 3).

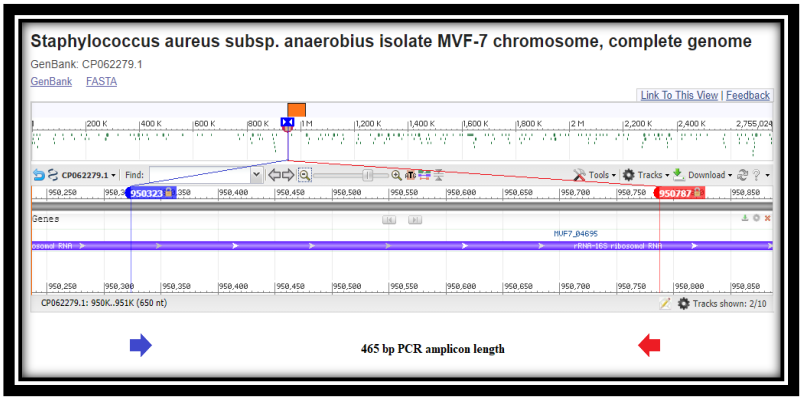

Figure (٣): The exact position of the retrieved 465 bp fragments (GenBank acc. no. CP062279.1).

The specifics of these sequences were underlined inside the amplified sequences after the 465 bp amplicons' sequences were positioned within the *16S rRNA* sequences (Table 2).

Table (2) The length and position of the 465 bp PCR amplicons (GenBank acc. no. CP062279.1).

Amplicon	Reference locus sequences (5′ - 3′)	length
16S rRNA sequences	CTACGGGAGGCAGCAGTAGGGAATCTTCCGCAATGGGC GAAAGCCTGACGGAGCAACGCCGCGTGAGTGATGAAG GTCTTCGGATCGTAAAACTCTGTTATTAGGGAAGAACA TATGTGTAAGTAACTGTGCACATCTTGACGGTACCTAAT CAGAAAGCCACGGCTAACTACGTGCCAGCAGCCGCGGT AATACGTAGGTGGCAAGCGTTATCCGGAATTATTGGGC GTAAAGCGCGCGTAGGCGGTTTTTTAAGTCTGATGTGA AAGCCCACGGCTCAACCGTGGAGGGTCATTGGAAACTG GAAAACTTGAGTGCAGAAGAGGAAAGTGGAATTCCATG TGTAGCGGTGAAATGCGCAGAGATATGGAGGAACACCA GTGGCGAAGGCGACTTTCTGGTCTGTAACTGACGCTGA TGTGCGAAAGCGTGGGGATCAAACAGGATTAGATACCC TGGTAGTCC	465 bp

Eight nucleic acid changes were found in the 465 bp samples after their alignment findings were compared to the appropriate *S. aureus* reference sequences. By aligning our examined samples with the most related sequences

stored in the NCBI database, these sequences were created. (GenBank acc. CP062279.1).

The currently observed nucleic acid substitutions as detected in the analyzed samples revealed highly interesting differences, with eight nucleic acids being substituted in the majority of the investigated samples. The chromatograms of these sequences were shown in accordance with their positions in the PCR amplicons, and the sequencing chromatograms of the discovered variant were validated and documented Figure (4).

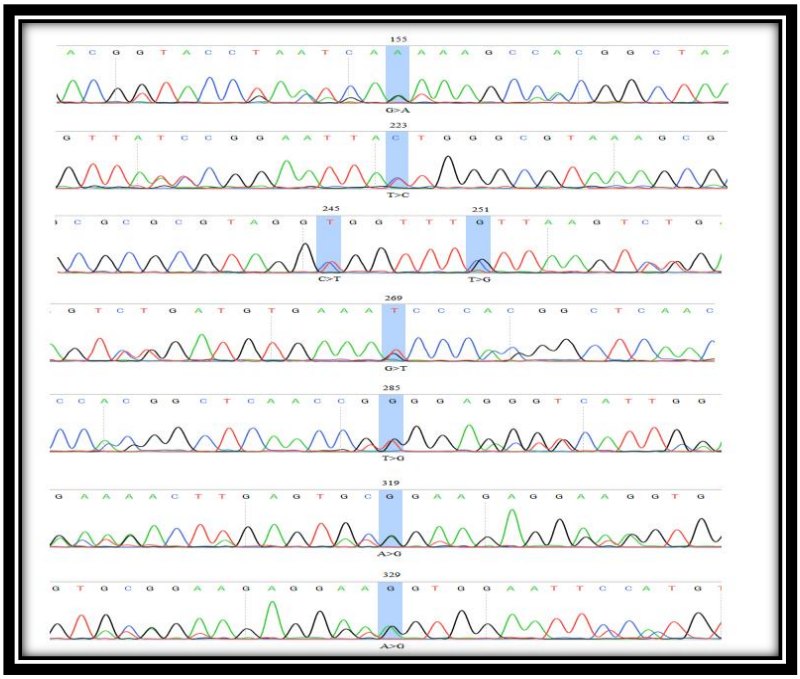

Figure 4 : The positions of substitution variants in the PCR amplicons are highlighted.

The positions and annotations of the identified nucleic acid substitution mutation were documented in the NCBI reference sequences to provide an overview of all the findings from the sequenced *16S rRNA* fragments. (Table 3).

Table (3): Comparing the 465 bp amplicons' detected SNPs to the NCBI reference sequences (GenBank acc. no. CP062279.1).

Sample No.	Native	Allele	PCR fragment Position	reference genome Position	summary of SNP
S1-S6, S8-S25, S27, S29	G	A	155	950477	CP062279.1 ;g. 950477 G>A
S1-S6, S8-S14, S17-S18, S20-S22, S24-S26, S29-S30	T	C	223	950545	CP062279.1 ;g. 950545 T>C
S1-S2, S8-S9, S11-S18, S20-S25, S27, S30	C	T	245	950567	CP062279.1 ;g. 950567 C>T
S1-S18, S20-S22, S24-S27, S29-S30	T	G	251	950573	CP062279.1 ;g. 950573 T>G
S1-S18, S20-S25, S27, S30	G	T	269	950591	CP062279.1 ;g. 950591 G>T
S1-S6, S8-S15, S17-S18, S20-S30	T	G	285	950607	CP062279.1 ;g. 950607 T>G
S1-S5, S8-S9, S11-S15, S17-S18, S20-S30	A	G	319	950641	CP062279.1 ;g. 950641 A>G
S1-S3, S5-S13, S15-S18, S20-S25, S27-S29	A	G	329	950651	CP062279.1 ;g. 950651 A>G

Based on the identified ribosomal nucleic acid sequences found in the examined bacterial samples, a complete phylogenetic tree was produced. This phylogenetic tree included all currently studied samples (S1 to S30) aligned with one another in a neighbour-joining manner, along with the other deposited DNA sequences. The other two organisms (*Pseudomonas aeruginosa* and *Escherichia coli*) were included as outgroup sequences inside the same tree. This complete tree required the existence of only one creature, *S. aureus*, which stands for the only nucleic acid sequences included in the tree. Based on the currently analyzed

genetic sequences of *S. aureus* sequences were clustered into many clades, which entails a wide range of diversity of this organism Figure (5). Furthermore, high phylogenetic distances (tree scale 1.0) were observed among the incorporated organism, which gives a further indication for the presence of high diversity among these sequences. The majority of our investigated samples was incorporated in unique clades within the *S. aureus* sequences. This sort of positioning was attributed to the high number of mutations detected in these samples. Likewise, another portion of our investigated samples (S3, S4, S5, S6, S10, S26, S28, and S29) was inserted near the GenBank accession number CP049423.1, which belonged to sequences from an American strain of *S. aureus*.

The same reason for the distribution of samples was also valid for S28, which was also aligned beside the S3 / S4 / S5 / S6 / S10 / S26 / S28 / S29 clade. high level of homology was originated from the currently observed similarity of the nucleic acid variations for both of these clades. Because of the same reason, The GenBank accession number KU922200.1, which belonged to a Chinese strain of the same S. aureus organism, was placed close to S19. Accordingly, this high level of homology was originated from the currently observed similarity of the nucleic acid variations for both of these clades, namely S3, S4, S5, S6, S10, S26, S28, and S29 clade and S19 clade.

Though many variations were observed in the currently investigated isolates, since the detected differences in these bacterial genomes were just small alterations, there was no deviation from the main phylogenetic distribution of all fourteen *S. aureus* investigated.

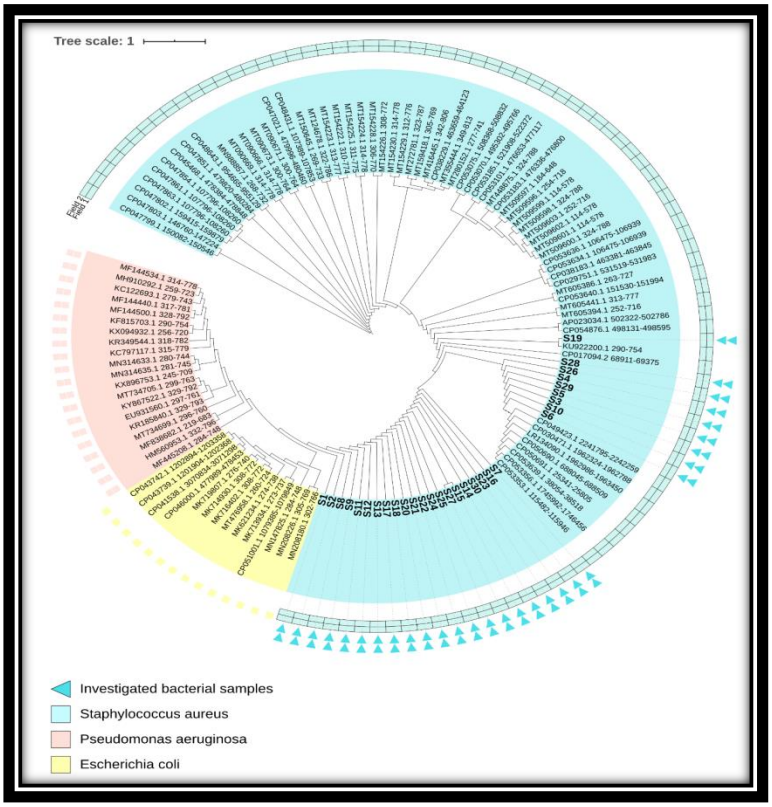

Figure (5): A complete and accurate phylogenetic tree of *Staphylococcus aureus* local isolates

However, it was inferred from this tree, that our investigated bacterial samples were distributed into three main clades; one major clade and two minor clades. The majority of samples were included in the major clade, which positioned in distinct phylogenetic positions toward the two incorporated outgroups of *P. aeruginosa* and *E. coli* sequences. This observation refers to the fact that these samples have the highest level of genetic mutations than the other two minor clades that are positioned in other non-unique places in the cladogram. This form of S1-S30 genetic distribution related to the ability of the *16S rRNA*-based 465 bp amplicons to accurately distinguish between the

bacterial samples under investigation. As well, the observed multiple clades in the generated cladogram suggest the presence of a high level of diversity of *S. aureus* sequences. Therefore, it was impossible to overlook the unique function played by the created phylogenetic tree in identifying the samples that were now being studied. This idea so gives additional evidence of the bacterial identity and precise genotyping of the examined bacterial samples. This comprehensive tree based on *16S rRNA* has presented an exhaustive tool to identify *S. aureus*.

Discussions:

The *S. aureus* forms a large yellow colony and changes the color of the medium from pink to yellow due to its ability to ferment mannitol sugar. Mannitol salt agar medium contains mannitol sugar, carbohydrate, phenol red as an indicator of pH, and 7.5% NaCl (high salt content). This medium inhibits the growth of most bacteria other than Staphylococci because of the high concentration of salt .Whereas most *Staphylococcus spp*. can tolerate high levels of salt and produce acidic due to mannitol fermentation . Due to the acidic substance, the pH decreases in the medium, rendering phenol red into yellow . Therefore, the mannitol salt agar medium is an excellent initial screen test for *S. aureus* and is especially useful when testing several isolates [16].

These results can explain the raw beef transfer from its source until it reaches your kitchen may contaminate with harmful types of bacteria that can cause food contamination, such as *S.aureus* [17]. Major beef product contamination occurs during handling, processing, and distribution. Therefore, it can use to promote personal health care. Hence, strict control and monitoring programs suggested reducing the risk of transferring animal-associated *S. aureus* to humans [18].

In comparison with canned beef, commercially canned foods considered healthy when manufactured under carefully regulated conditions. When canned

beef shows signs of spoilage, leakage , smell, or mold. Canned beef can have toxins if not sufficiently treated [19].

The results indicated that PCR assay seems to be more specific for detecting *S. aureus* and appears to be more reliable than conventional methods for assessing foods bacteriological safety [20].

The results were less to the results obtained by Arabestani *et al*., [21] in Hamadan province, Iran, who found of *S.aureus* was (9.49%) from raw beefs. Also, Baghbaderani *et al*., [22] found forty-eight out of 485 (9.89%) raw retail meat samples contaminated with *S. aureus*. Also , less than many other studies conducted in many countries of the world, who found the prevalence of *S.aureus* isolated from meat samples was 66.67% (80/120) [23]. Other researchers found that 100 meat samples, *S. aureus*, are the most predominant isolate with 76% [24]. While Sangeetha *et al* ., [25] found the percentage of *S.aureus* was 27% higher in meat samples.

To prevent food poisoning from meat contamination, it advised to separate it from the rest of the food in storage to ensure that the harmful bacteria do not transmit them to the rest of the food. You should also make sure to wash your hands and tools that contact with meat to ensure that harmful bacteria do not spread to other types of food and may not expose to to kills heat during the cooking [17].

Biochemical tests are insufficient for dependable recognition of *S. aureus* strains. Consequently, both biochemical and genetic tests completed for the right distinguishing of the isolated strains.The phenotypic techniques are not strictly efficient because antigenically identical to staphylococcal enterotoxins. Molecular genetic procedures recommended identifying *S. aureus* enterotoxins genes such as conventional PCR [26].

Conclusions:

It was noted that a difference in bacterial contamination rates between different field studies due to differences in the source of meat contamination. It is accurate through an external source such as feed manufacturing, animal breeding on the farm, transfer the animals to the place of slaughter, animal slaughter, meat cutting, and processing, transfer to the sales outlets, offer in stores and meat centers, at home or an internal source as a result of infection with a bacterial disease.

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Biodiversity and climate changes: A review

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Featured Application: Authors are encouraged to provide a concise description of the specific application or a potential application of the work. This section is not mandatory.

Abstract: Some living organisms have been eliminated in some ecosystems; while some diseases are recently caused by changes in climate which affect greenhouse gases and disturb these ecosystems. For an extent, the temperature of the earth planet had been elevated markedly since the last 100.000 years which can strongly affect the normal existence of living beings like animals, plants and microorganisms. So this review has be written to document the impact of climate changes on biodiversity.

Keywords: Biodiversity, global warming, climate changes, ecosystems.

1. Introduction

As earth skin has been changed, moderating of living-nonliving balance has interrupted which influences species extinction to occur even it is considered as a natural phenomenon **[1]** but some organisms have had a definite life span especially when they force harsh climate conditions and fail in adaptation resulting in accelerating their extinction within few years rather than longer **[2].**The life span was 60-80 years for some human beings in natural ecosystems in earlier times **[3]**, but in last few years it becomes lower as a result of interference with new environmental situations **[4].**

Habitat loss was also a serious problem which causes threat to species to be extinct, either by human activities or destroying by nature. Deforestation the forest areas can satisfy human needs but decreases population of some animal and plant species, which cannot further adapt new living habitat **[5].**

So the objectives of this review:

-preserve diversity and support species life

-maintain ecological undesired processes

-use sustainable resources to keep living and non-living balance

-prevent extinction of animal and plant species.

2. What is Biodiversity?

Biodiversity refers to the variety of living organisms within given area like plants, animals besides microorganisms, It can be divided to biological diversity

which dealt with living things, and diversity which means variety of ecosystems like forests. The genes of living organisms in specific ecosystems can also be considered because these living beings form a part of these areas **[6].** Biodiversity consisted of three levels: Genetic diversity, species diversity and ecosystems diversity **[7].**

The genetic diversity means the forms of living things which the ecosystem contains, or the breeds, varieties or races of the same species; for example the different colors of butterflies to adapt changing of the environment **[4].**

The second level is the species diversity which refers to the number of different species that are represented in a given community. Also the number of species per unit of the area which is called species richness can be related to the species biodiversity **[8];** in addition to the species abundance which deals with the number of individuals per species in a community. Another term which is "Relative Abundance" of species refers to how common or rare species in relative to other defined species in a certain community **[9]**.

The ecosystem means north of south areas like forest, for examples, regardless the species they both contains, dealing with the temperature and rainfall or other climate conditions **[10].**

Biodiversity is important as it affects creatures' distribution in following areas: tropical rainy forests, deserts, boreal forests, grass lands as a form of ecosystems diversity. While the species diversity is related to founded organisms (as algae, bacteria, fungi, etc…) according to their features to adapt the given area and interact with it **[3].** As a result, genetic diversity will be related to the races of these living organisms to distinct populations from the species to the detailed characteristics within the species giving the external and internal evolutionary level of individuals, which can tightly linked to the outer changes in ecosystem **[5].**

3. Measurements of Biodiversity:

The biodiversity can be measured in three terms: alpha, beta and gamma. Alpha biodiversity can be applied within particular area to measure the number of the abundant species, while beta biodiversity makes a comparison between two distinct ecosystems as amount of species. Gamma biodiversity measures overall diversities within a large region as a geographical scale species **[8].**

The values of biodiversity measurement **[8]**:

Measurement of biodiversity as alpha, beta and gamma can all be resulted in following values:

1) Ecosystem-ecological values: like nutrient, energy, pollution breakdown and ecosystem stability.

2) Biological values: like food, medicinal plants, pharmaceutical drugs, breeding stocks and genomics of species.

3) Social values: like research, education, tourism and cultural values.

4. Causes of biodiversity loss:

Biodiversity has been lost recently according to many factors that can be categorized to main two causes: Natural factors and man-made factors **[11].** Natural factors include floods, earth quacks, landslides, lake of pollination and diseases. On the other hand, the man-made causes include anthropological habits, invasive species, over exploitation species, human over population, genetic pollution besides global warming and climate changes **[12].**

5. What is climate change?

Climate change is one of humanity's most serious threats, putting at risk the functioning of the natural systems that sustain human health. In the Anthropogenic, human activities have significantly altered the Earth through global warming, habitat loss and changes to the atmosphere. Based on a moderate emissions scenario that reflects little change from today's development patterns, the average global temperatures will rise by 2.1–3.5 °C from preindustrial levels, which is above the 1.5–2 °C threshold set by the 2015 Paris Agreement **[13]** (Figure 1). Although many countries committed to reduce carbon emissions and waste at the 26th United Nations Climate Change Conference and still aim at net-zero emissions, these commitments are insufficient to reach the target of keeping global warming within 1.5 °C above preindustrial levels **[11].** Despite scientific evidence, the gap between what we know and what we do in practice and political inaction continue to prevail. The co-occurrence and synergistic interaction of climate change, loss of biodiversity and effects on food production have an exponential multiplier effect on human health compared to when these conditions are experienced separately. For example, food production and processing, retail, distribution and consumption, as well as food waste, contribute to climate change through the emissions of greenhouse gas **[2].**

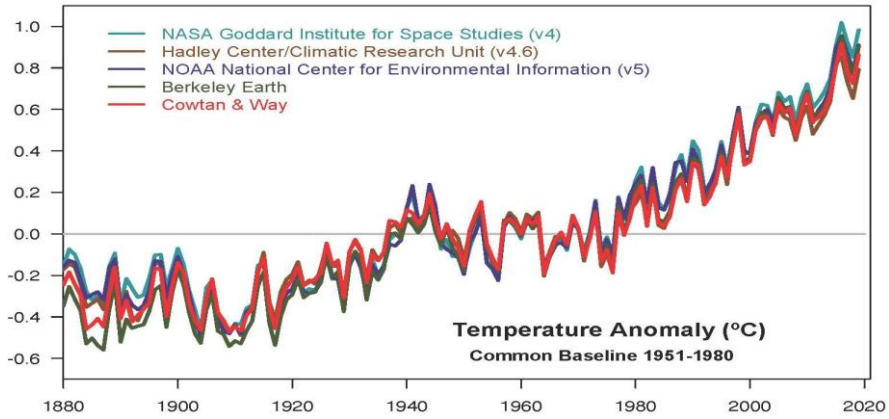

Fig. (1): Changing of average temperature of earth planet **[14].**

Climate change has a big effect on landscape which has been dramatically increased over the last few decades. It is a serious global challenge which the entire world becomes worried about its impact of warmer temperature and higher rainfalls with severe floods **[1]**, and heat waves become more frequent and severe. Climate change causes biodiversity to move towards its minimum limits of life in addition to be in the wrong place for crops relying on producing fewer yields **[15].** Experts concluded that the extinction of animals becomes more life-threatening in the changing climate and pollution crisis **[16].** 1million animal species are at risk to be extinct. Food and drink are also will be limited for these creatures as the relationship with the ecosystem changes. Recent documents have referred to that 97% of global biodiversity is degraded by human actions. This needs more efforts in maintain biodiversity **[10].**

Via conferences and communiqués, global communities are work together for alarming about this serious issue of losing biodiversity in addition to food insecurity because crops and some plants are no longer been protected. Scientists also predicted that human can be interacted to some wild pathogens in faster rates which can harmful to health and socioeconomic status **[17].**

6. What causes Climate change?

The climate is constantly changed through geological time perspectives and has many cycles since ice ages which affect the species which can be continued to our planet, in same time it leads to the extinction of some creatures like dinosaurs; and this is actually a natural process **[11]**. However, scientists focused on a very short period of the time just before the industrial until our era which is the time when human activity is causing a lot of impact on the environment and

the climate since industrial evolution, needing to know what people can do for sustainable development **[4].**

One of the examples of impact of climate change in pre-industrial age which is about 300 years ago, vast tracks of forests, lots of amazing biodiversity simultaneously with human activity related to human energy to do work himself; or by using some domesticated animals for addition strength for his work until using of some basic tools like carts **[10]**. So, resources were abundant everywhere and humans were able to reach these resources and there was only small urban populations had huge wild areas in which carnivores were still present rampantly in terms of agriculture was mainly subsistent agriculture so people planted their own needs **[5].**

In the industrial age, challenges for providing human things and amenities in same time lots of diseases were appeared. Many machines suddenly had been invented to help human by using energy fossil energy that were stored in the earth like petrol which was extracted and used in such machines and factories leading to pollution and emotion to the atmosphere **[9]**, in addition to the need to fertilizers and pesticides for modern agricultural strategies of crops for growing number of populations **[16].** Then, the need to more and more lands was encroached to the natural habitats of wild animals and plants via much intensified agriculture and for transportation. Diagrammatically, the postindustrial age represented large scale industries with large urban population, with pretty limited areas of wildness **[15]** (Figure 2).

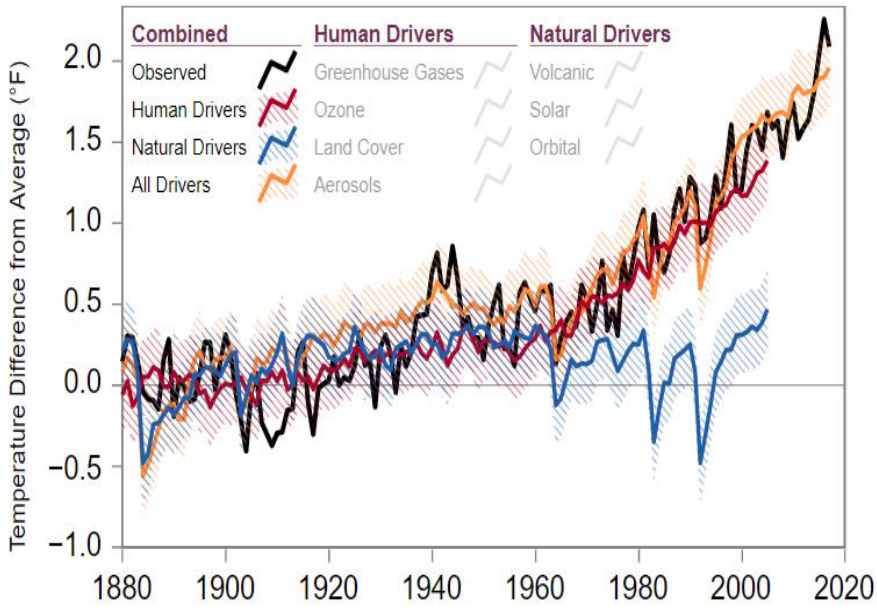

Fig. (2): Human and natural influences on global temperature **[18].**

7. Climate change impact on the earth:

Apart of resources depletion and degradation of natural spaces of creatures, the emitted greenhouse gases into the atmosphere like carbon dioxide, which is the most familiar one, with methane which is generated from agricultural activities and nitrous oxide from the fertilizers of crops are the main three greenhouse gases (Figure 3). So, gradually these gases were admitted to the atmosphere in huge amounts even they are necessary to trap sun's energy to keep some of heat so we can live and thrive on the earth planet **[19].**

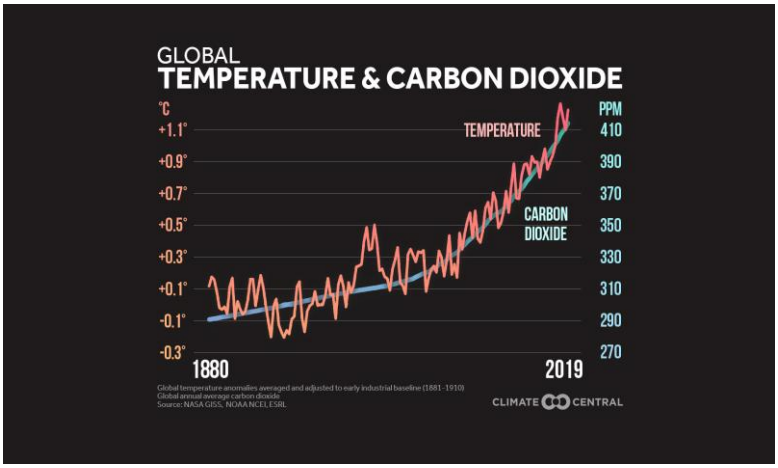

Fig. (3): Global temperature and carbon dioxide levels for a long period of time **(NASA, 2020)**.

However, the balance of atmospheric gases was tipped because the mentioned three gases were released more than accepted limits; so the heat is being more trapped since 1980s when the warmest decades were recorded in the data until the 1990s and dramatically 2000s **[20].**

In this millennium, the same pattern gave the evidence that the earth's average temperature indeed on the rise **[13].** This raised temperature leads to elevated humidity and air temperature near the surface with high temperature of the oceans and sea surface water and over lands, resulting in melting of glaciers and sea ice then increasing in sea water amount **[12].** (Figure 4).

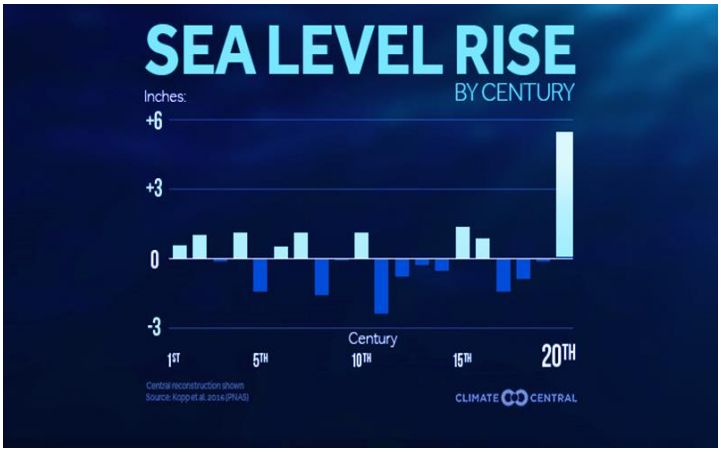

Fig. (4): Sea level rise by inches during one century **[21].**

Pollution can also affect negatively biodiversity of many organisms as a big threat to the life of wild plants and big animals. Survival organisms are unlikely to be alive if the causal factors of climate changes continued. The removal or disturbance of any part in ecosystem can strongly affect functions of these resources like in food chain or animal shelters **[9]**.

8. Climate change impact on biodiversity:

Biological diversity plays an important role in formation of soil and nutrition or moisture. So loss of diversity in animals or bacteria through cleaning these areas can reduce productivity, either by human anthropological habits or by climate disorders **[3].** Some organisms are conserved through biodiversity for some reasons by looking at the importance of variation to prevent species extinction. So it seems essential to maintain global food chain in addition to be in a balance in conservation of animals or plants on earth **[22].**

Some surrounding factors like pesticides, chemicals, people behaviors, climate, and environmental factors all have a direct impact to the limited existed species of animals and plants, in addition to microorganisms **[4].** Contribution to the climate, vegetation influence can be obtained by rainfall and recycling vapor at a steady rate to maintain water in atmosphere, so vegetation is depending on the climate and some organisms for the sustainability of breeding plants **[10].** Ecosystem relationship with animals and plants refers to a web of connections among non-living and living things, because survived organisms can maintain balance of atmosphere gases and soil moisture besides complex relation with microorganisms in each environment **[19].**

Biodiversity is responsible of 1.5 million species of organisms on the earth, which is very important to living organisms. The biodiversity refers to the huge variation of life on the earth which gives the life forms in extreme cold regions or hot deserts and tropical forests in addition to oceans organisms **[17]**.

For example, in food-productive animals, only two out of nine species can be domesticated nowadays, which are cattle and chickens whose protein can be consumed by people for a large scale**.** Fish are lesser to be domesticated even if they have been grown in farms by modern agricultural techniques. Plants, on the other hand, become consumed by a very small proportion of people; so fewer species, like wheat and rice, form two-third of food supply rather than other plants **[13].**

Turtles which come to beaches to nest are critically endangered due to man's activities and fishing activities, so these turtles are either die or their eggs are poached threatening the survival of their species **[6]**; besides climate change affects them during nesting season and turtles which are born at beaches on high

temperature lands making sex ratio to be affected as the turtles laying on their legs depending on the coast temperature which are not preferable and threaten the viability **[22].** In addition, the ability of new turtles to swim into the open seas is impeded as a result of hotter temperature so these species can be fall as a prey to big fish around easily and their survival become threatened **[23].**

The species number has been reduced to a critical level and the natural habitats has drastically minimized. Some examples of these animals are Cheetah, Sloth bear, Elephant, Indian wild ass, Chinkara, Lion tailed macaque. The plants which are under extinction are carrots, chilies, turnip and some crops **[2].** (Figure 5).

Orangutans mammals are also affected by climate change which compounds the existing activities imposed upon them already with the fragmentation of their habitats which would be changed to agriculture or used lands **[7].** The raised temperature give the chance for forest fires to become greater and also affects fruiting periods which these orangutans are relying on. Climate change is also causing extreme weather and rainfall patterns which are dramatically changed to more rainfall at certain times of the year; besides less rainfall at other times of the year causing almost dry spells which were not found at the past **[3].** The total amount of rainfall annually does not remain the same but drastically changed which will also affects the fruiting and flowering periods and eventually the food source that animals depending on **[12].**

Other animal species are also going to be threatened by these kinds of impacts and habitats and food loss. The aquatic habitats which are the various corals occupy are usually represents biodiversity coral reefs which would be existence stressors due to the pollutants which are resulting from human evolutionary pattern that affect their viability **[4].** Besides the negative impact of high temperature on oceans as they are the natural carbon sink as the high lots of carbon put into seas and oceans are being absorbed by its water starting getting acidification occurring in these oceans lowering the pH levels; and when this happens it would be difficult for calcification to occur which promote coral growth and coral growth becomes stunted **[23].**

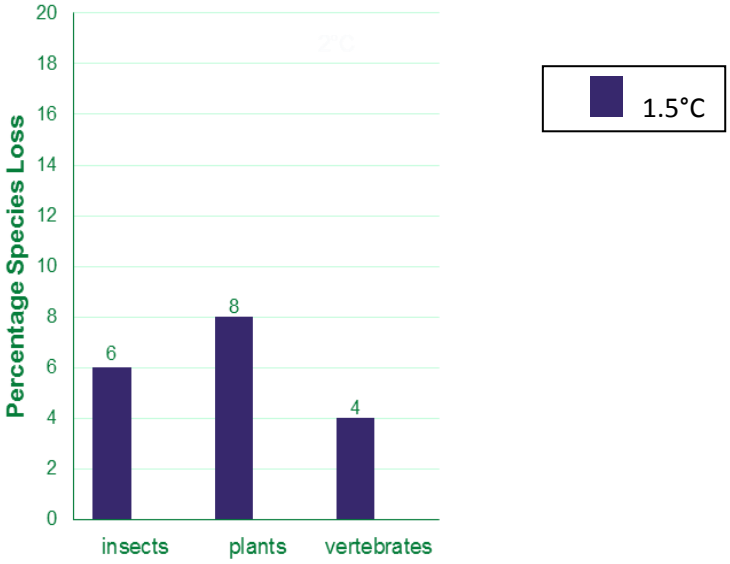

Fig. (5): Loss of different living organisms due to global warming **[24].**

Another effect of global warming, the seas' temperature are elevated as well beyond certain optimal ranges resulting in coral leaching because the algae that is in the coral reefs which provide colors and nutrients for the growth of the corals gets expelled out **[15]**. Fish which are using the coral reefs as their spawning ground will lose the area of breading and nursery **[17].** (Figure 6).

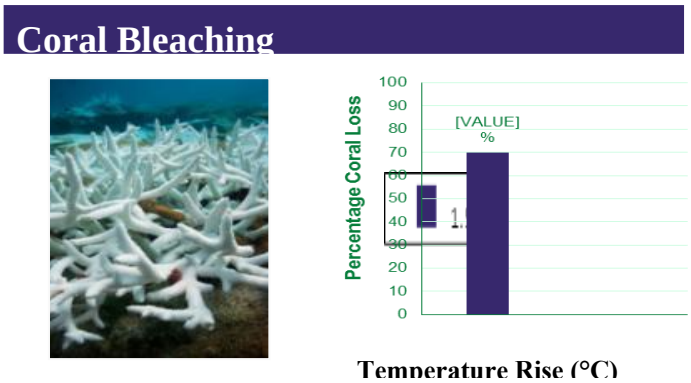

Fig. (6): Coral bleaching as a result of high temperatures of seas **[25].**

Terrestrial animals' habitats in forests can be minimized by forest fires with increasing temperatures. The shifting ranges and distributions can be seen in mountain areas in which migrated animals are located with no other areas to go anymore likewise in conditions of sea levels rise encroaching upon the high lands with no enough space of biodiversity to move as they finally lose their original habitats and ability to live. Furthermore, diseases can be resulted from changing climate bringing about various types of pathogens in a complex manner **[13].**

An example about tree diseases from the united states is the dramatic loss of the pine tree (pine nuts) which results from warmer winters, severe drought, incidences, heat waves and frequent fires making the pine tree produce less saps which are considered as a defense mechanism against pests which are themselves have less winter mortality because the winter nowadays is warmer and have two life cycles instead of a single one **[1]**. So, the population of the pets, like beetles, becomes higher and can attack the pine trees easily. In the same time, the attacked and died trees with the elevated greenhouse gases can increase the risk of forest fires which means release of more carbon into the atmosphere **[5].**

Another example also from the united states is the moose with warmer and shorter winters as more ticks (more than 15.000 new types of ticks) can actually stuck to moose skin leading to the loss of blood making the moose to be anemic and start to lose hair from scratching areas of skin with start losing its body heat declining moose population especially in rainy times, compounding with many other threats that moose species are already facing **[26].**

In microbiology, many pandemic have occurred recently in the world in potentially related with climate change consequences like in viral assembly, host-interactions and function of new active viruses like in Covid-19 **[27],** and these viral processes in turn contributed to climate impact on virus behavior, particularly those linked to biogeochemical cycles and biological production un a relationship of relationships between viral or microbial actions with global phenomenon **[17].**

9. Conclusions

Despite the advances that are made in the industrial age for humans like clean water, good houses, energy supply, health care, medication and public health, but that is all coming in a point of threatening the ability to survive, food insecurity, lower yields due to rainfalls at certain times only, reduced air quality,

and water security and quality, habitat insecurity. So, climate changes can compound living beings existence and could possibly cause a dieback of them.

10. **Recommendations:**

1-Using of the energy moderately, and trying new renewable energy

2-Consuming meat and crops wisely

3-Recycling wastes and reuse of them

4-Speaking to people in awareness tutorials about pollution

5-Planting trees to recycle carbon in the atmosphere and change it to oxygen, in addition to providing food, beauty and mitigatives of desertification

6-Usage of measurements of greenhouse gases and emissions

7-Until the climate stabilizes in the future after a period of time, we should be adapted and prepared to be withstand along with these changes nowadays.

8-Biodiversity and nature should be invested by providing good habitats and forest areas for multiple species, with protecting and enabling them to evolve and take adaptation measurements of the climate changing. This can also be achieved by:

- Plant seed banks in very low temperature without losing their viability.
- Animal semen banks of male animals
- Gene banks by selecting useful genes of wild varieties

9- Having more green spaces and vegetable gardens in the urban areas

10- Restoring the balance within ecosystems

11-Keeping good water quality parameters as much as possible.

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دراسة المستخلصات المائيه لزهرة الشمس والذره البيضاء على انبات ونمو نبات خروب الخنزير السام *Anagyrus foetida*

Studying Allelopathy Effect of Aquatic Extractsof sun flower and sorghum in germination and growth poisonous plant bean clover Anagyrus foetida L.

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الخلاصه: اجريت الدراسة في مختبرات قسم المحاصيل الحقلية بكلية الزراعة – جامعة تكريت في الفترة الواقعة بين شهر نيسان 2013 ولغاية كانون الثاني 2014 وذلك لدراسة التاثير الاليلوباثي للمستخلصات المائية للمجموعين الجذري والخضري لكل من زهرة الشمس. والذرةالبيضاء على انبات ونمو نبات خروب الخنزير السام *Anagyris foetida* L. ، تم جني مخلفات زهرة الشمس والذرة البيضاء (المجموع الجذري والخضري) من الحقول الزراعية من قضاء الحويجة في محافظة كركوك وكذلك تم جني ثمار خروب الخنزير السام من نفس المنطقة والحصول على البذور منها بعد فصلها وتنظيفها وتجفيفها هوائيا .

طبقت تجربة حقليه تضمنت كلاهما اضافة المستخلصات المائية للمجموعين الجذري والخضري لكل من زهرة الشمس والذرة البيضاء وبنسبة (2 و 4 و 8%) الى بذور نبات خروب الخنزير السام ، تضمنت كلا التجربتين 16 معاملة مع معاملات السيطرة (اضافة الماء المقطر فقط) ، طبقت المعاملات في التجربة المختبرية والتجربة الحقلية كتجارب بسيطة بالتصميم العشوائي الكامل C.R.D. وبثلاث مكررات.

تم دراسة الصفات الخضرية وتحليل الكلوروفيل وقياس الوزن الجاف للنباتات المعاملة بالمستخلصات المائية للنباتات المذكورة حيث ان الهدف من البحث هودراسه تاثير المستخلصات المائيه لبعض النباتات على تقليل الصفات الفسلجيه والخضريه لنبات خروب الخنزير وكانت النتائج هي تاثر جميع الصفات الحقليه لنبات خروب الخنزير بالمستخلصات المائيه لنباتي زهره الشمس والذره البيضاء كمااظهرت المستخلصات المائيه لزهره الشمس والذره البيضاء تاثيرا اليلوباثيا في الوزن الجاف للمجموع الجذري والخضري لنبات خروب الخنزير

الكلمات المفتاحيه

اليلوباثي, Anagyrus foetida

summary: This study was conducted at the laboratories of Field Crop Department of Agriculture college in Tikrit University from April 2013 till January 2014 to study allelopathic effect for aquatic extracts of root and vegetative parts for each sun flower and sorghum on germination and growth of Bean clovor poisonous plant, sun flower and sorghum recycle (rooting and vegetative parts) were collected from Hawija area of Kirkuk governake and also Bean clovor fruit was collected from the same area and seeds were gained after cleaning and drying.

field experiment was conducted , encluded using aquatic extracts of rooting and vegetative parts for each sun flower and sorghum in (2,4 and 8%) to seeds of Bean clovor poisonous plant, both experiments were included 16 treatment with comparison treatments (addition distel water only) , The experiments were designed according to Complete Randomized Design (C.R.D.) with three replicates.

Vegetative characters were studied and analysed of chlorophyll and measuring dry weight for treatment plant with aquatic extracts .the aim of research is study effect of aquatic extracts for some plant on reduse phesyology and vegygative characters on *anagyrus foetida* , the results showed all field characters affected with aquatic extracts for sun flower and white corn so they affected on dry weigh for vegetative and root groops for anagyrus foetida plant

Key words

Anagyrus foetida, alellopathy

١- **المقدمه** :الأليلوباثي مصطلح اطلق من قبل العالم Molish للربط بين الكلمتين الإغريقيتين Allelo و Pathy التي تعني التداخل المتبادل بين الكائنات الحية وان هذا المصطلح يشمل عادة التداخلات الضارة والنافعة بين النباتات التي تحدث من خلال التأثيرات الكيمياوية [1] ، واستخدم مصطلح التعارض Interferance للتعبير عن جميع التأثيرات لنبات ما في نبات اخر وضمن بذلك عاملي التنافس والأليلوباثي وقد عرف التنافس بأن نبات معين يشارك بالعوامل البيئية والضرورية كالغذاءو الماء والضوء مسببا النقص في هذه العوامل والتي تؤثر في نبات اخر ينمو في نفس البيئة [2] اما Rice فقد ذكر أن الأليلوباثي يشمل التأثيرات البايوكيمياوية السلبية لنبات ما في نبات اخر وبضمنها الكائنات الدقيقة[3] .

ان الأليلوباثي أو التضاد الكيمياوي اعتبر ظاهرة بيئية معقدة تشمل التداخلات البيوكيمياوية بين النباتات وبضمنها الأحياء المجهرية وتحدث هذه الظاهرة نتيجة لتحرر بعض المركبات الكيميائية إلى البيئة المحيطة بها وبطرائق مختلفة فتؤثر سلبا أو إيجابا في نمو ووظائف الأحياء المستقبلة لها وهذه المركبات هي مواد ناتجة من عمليات الأيض الثانوي للنبات secondary metabolism تنتج أما طبيعيا داخل النبات كنواتج ثانوية تخزن داخل فجوة الخلية أوتتحرر إلى البيئة الخارجية لتؤثر في النباتات والأحياء الأخرى أو تنتج عرضيا نتيجة الأصابة بأضرار ميكانيكية أو فسيولوجية كالأمراض والحشرات والأجهادات البيئية الأخرى ، تختلف أنواع هذه المركبات بإختلاف النوع النباتي ومراحل نموه والجزء النباتي الموجودة فيه وتزداد أوتنخفض تراكيزها بتأثير عوامل بيئية واحيائية مختلفة [4].

ان المركبات الأليلوباثية هي مركبات كيمياوية ثانوية عرضية تتحرر من اي جزء من النبات وتمثل الأوراق والسيقان والجذور مصدرا رئيسا لهذه المركبات إذ أنها تنتج من النبات سواء كان حيا ام ميتا وقد يكون لها مصدر مجهول في عملية الأيض الأساسية للكائنات الحية [5,4] ، هناك نوعين من المركبات الأليلوباثية الأولى عبارة عن اطلاق المواد السامة بالهيئة نفسها التي أنتجت فيها داخل النبات والثاني هي المواد التي تكون

سامة نتيجة لعمليات التحول التي تقوم بها الأحياء المجهرية على تلك المركبات [6] ، تتباين مركبات التضاد الحياتي إعتمادا على طبيعتها الكيميائية ومن أهمها الاحماض الفينولية التي لها تطبيق اليلوباثي معروف مثل احماض البنزويك والتانينات والتربينات والقلويدات والاستيرويدات الا أن اكثر هذه المركبات أهمية هي المركبات الفينولية والمركبات القلويدية والمركبات التربينية [8,7] .

ان المركبات الأليلوباثية قد لاتكون سامة للنبات نفسه بل قد تؤثر في النباتات الاخرى اذ ان افرازات جذور الدغلين الفجيلة *Raphanis raphanistrum* والشوفان البري *Avena fatua* أدت إلى نقص في إنبات بذور نباتات حنطة الخبز والحنطة الخشنة وأرجعت السبب إلى أن جذور هذه النباتات افرزت العديد من السموم النباتية التي تسبب تثبيط إنبات هذه البذور وانخفاض نموها [9] ، كذلك ان المركبات الأليلوباثية التي تنتج من الأجزاء النباتية يتأثر كمية إنتاجها بعوامل بيئية مختلفة منها درجة الحرارة والرطوبة والرقم الهيدروجيني والعناصر الغذائية ودرجة تصريف الماء والأحياء المجهرية في التربة وان توفر ظروف بيئية مناسبة مثل الرطوبة تعتبر من العوامل الرئيسية في اظهار سمية المخلفات[10] وقد أكدت [11] ان امكانية بقاء المركبات الأليلوباثية المتحررة من مخلفات الرز فعالة لفترة معينة طويلة في التربة اذ ان الجهد السمي لمخلفات الرز استمر في اظهار تأثيره التثبيطي في الأصناف المختبرة طيلة 8 اسابيع من التحضين والذي يؤكد ان لهذه المركبات تأثيرا مباشرا في إنبات ونمو نبات الحنطة عند بداية الموسم الزراعي الشتوي حيث بإمكان هذه المركبات ان تبقى بصورة فعالة ومؤثرة خلال الأسابيع الأولى من التحلل ويقل تأثيرها نسبيا اذا كانت كمية المخلفات الموجودة في التربة قليلة ولكن التأثير يستمر لفترة اطول اذا توفرت كميات مناسبة من المخلفات.

٢-المواد وطرائق العمل

جمع النماذج النباتية

تم جمع نباتات زهرة الشمس. والذرة البيضاء خلال الموسم الزراعي 2013 من الحقول الزراعية من قضاء الحويجة في محافظة كركوك وكانت مرحلة النمو للنباتات هي مرحلة النمو الخضري حيث قلعت مع الجذور (مجموع جذري ومجموع خضري) وغسلت النباتات جيدا لإزالة الشوائب العالقة بها وبعد ذلك تم فصل المجموع الجذري عن المجموع الخضري لكل نبات وجففت تحت اشعة الشمس ثم قطعت إلى قطع صغيرة بعد ذلك جففت بالفرن الكهربائي تحت درجة حرارة (70 مْ) لمدة 3 ايام ثم طحنت النماذج بواسطة مطحنة كهربائية من نوع مولينكس وحفظت في عبوات بلاستيكية مغلقة بإحكام لحين إستخدامها وحفظت في مكان بارد وجاف.

تحضير المستخلص المائي

تم تحضير المستخلص المائي وبتراكيز(2و4و8%) لكل معاملة من المعاملات المستخدمة في التجربة باخذ 2 غم من مسحوق الأجزاء النباتية المختلفة ومزجت مع 100 مل من الماء المقطر حسب طريقة[12] ووضع الخليط (الماء المقطر والمسحوق النباتي) في الخلاط الكهربائي لمدة ربع ساعة ثم رشح النموذج بثلاث طبقات من قطع الشاش وبعدها رشح المحلول بورق ترشيح من نوع Whatman No.1 ووضع المحلول الخاص بكل تركيز نوع من انواع النباتات ولكل جزء نباتي في قناني زجاجية محكمة الغلق داخل أكياس سوداء وحفظت في الثلاجة بدرجة حرارة (5 مْ) لحين الإستعمال.

التجربه الحقليه

تم تطبيق تجربتين استخدم فيها اكياس بلاستيكية خلال الموسم الزراعي 2013 في أرض البيوت البلاستيكية من كلية الزراعة في جامعة تكريت اذ تضمنت التجربة الاولى دراسة تاثير المستخلصات المائية للمجموعين الجذري والخضري (ساق+اوراق) لكل من زهرة الشمس والذرة البيضاء في نسبة الإنبات أما التجربة الثانية فتضمنت إستخدام هذه المستخلصات كمادة رش خضري بعد الإنبات و كانت المعاملات التي طبقت في التجربة كالأتي :-

1- المستخلص المائي للمجموع الجذري لزهرة الشمس بنسبة 2 %

2- المستخلص المائي للمجموع الجذري لزهرة الشمس بنسبة 4%

3-المستخلص المائي للمجموع الجذري لزهره الشمس بنسبة 8%

4-معاملة السيطرة Control

5- المستخلص المائي للمجموع الخضري لزهره الشمس بنسبة 2%

6- المستخلص المائي للمجموع الخضري لزهرة الشمس بنسبة 4%

7-المستخلص المائي للمجموع الخضري لزهره الشمس بنسبة 8%

8-معاملة السيطرة Control

9-المستخلص المائي للمجموع الجذري للذره البيضاء بنسبة 2 %

10- المستخلص المائي للمجموع الجذري للذره البيضاء بنسبة 4%

11-المستخلص المائي للمجموع الجذري للذره البيضاء بنسبة 8%

12-معاملة السيطرة Control

13- المستخلص المائي للمجموع الخضري للذره البيضاء بنسبة 2%

14- المستخلص المائي للمجموع الخضري لزهرة الشمس للذره البيضاء بنسبة 4%

15-المستخلص المائي للمجموع الخضري للذره البيضاء بنسبة 8%

16-معاملة السيطرة Control

استخدمت أكياس بلاستيكية للزراعة بقطر 20 سم وارتفاع 20 سم وملئت بالتربة المزيجية النظيفة بعد خلطها بكمية متساوية من البتموس ثم وضعت البذور في السنادين بعد اجراء عملية التخديش وذلك بعمل 3 خدوش من كل جانب من جوانب البذرة اذ بلغ عدد البذور 25 بذرة لكل معاملة ثم خفت النباتات إلى 5 نباتات في كل معاملة، اضيفت المستخلصات المائية للمعاملات المذكورة إلى السنادين لمعرفة نسبة الإنبات والنسبة المئوية لمكافحة النبات السام بعد ذلك تم ري السنادين كلما دعت الحاجة أما في التجربة الثانية فقد

تم اضافة المعاملات بعد الإنبات إلى السنادين بواسطة مرشة يدوية وتم قياس الصفات الاتية:

1-النسبة المئوية للإنبات (%)

حيث اخذت النسبة المئوية للإنبات بعد مرور 10 ايام من الزراعة حسب المعادلة الاتية:

النسبة المئوية للإنبات= عدد البادرات الظاهرة \ عدد البذور **المزروعة** × **100** [13]

2- طول النبات (سم)

3- عدد الأفرع

4- طول السلامية (سم)

5- دليل المساحة الورقية (سم2)

اختيرت ٣ فروع معتدله النمو من ٣ نباتات عشوائيه في مرحله الحصاد واخذ قياس طول ٣ وريقات وعرضهامن قاعدة كل ورقه ووسطه وقمته وتم استخراج مساحة الورقه من حساب طول الوريقات وعرضها حسب المعادله التاليه

المساحه الورقيه=0.75 x (طول الورقه وعرضها) [14]

دليل المساحه الورقيه= المساحه الورقيه/ المساحه التي يشغلها النبات [15]

6- الوزن الجاف للمجموع الخضري

7- الوزن الجاف للمجموع الجذري

8- عدد الثمرات

9-طول الثمره

التحليل الاحصائي

اجريت التجربة وفق التصميم العشوائي الكامل (C.R.D.) Completely Randomize Design بأستخدام تحليل التباين (ANOVA) واختبرت الفروق بين المتوسطات الحسابية عند مستوى احتمالية 0.05 بإستخدام إختبار دانكن متعدد الحدود [16].

٣-النتائج والمناقشه

التجربة الحقليه

تأثير المستخلصات المائية في الإنبات والنمو

1- نسبة الإنبات (%)

اظهرت النتائج عند معاملة بذور نبات خروب الخنزيربمستخلصات المجموع الجذري لزهرة الشمس بتركيز 8% انخفاض في نسبة الإنبات بشكل معنوي بمقدار 37.67% مقارنة بمعاملة السيطرة التي اعطت اعلى نسبة إنبات فيها 100% اما المجموع الخضري لزهرة الشمس بتركيز 2% ادى الى انخفاض نسبة الإنبات بشكل معنوي بمقدار 56.43% مقارنة بالمعاملات الاخرى التي ظهرت متقاربه (جدول 1) وهذه النتائج تتفق مع ماتوصلت اليه سعيد (1988) اذ وجدت ان المستخلصات المائية للأجزاء الخضرية والجذرية لمحاصيل زهرة الشمس والذرة الصفراء والقطن ثبطت انبات البذور ونمو بادرات صنفي الحنطة ابو غريب ومكسيباك، وقد اظهرت الدراسة من ان المستخلصات المائية لزهرة الشمس ذات تأثيرات اليلوباثية واضحة في انبات الأدغال المدروسة ونموها مما يعطي هذا الأمر مؤشرا ايجابيا واضحا في إمكانية إستغلال هذه الظاهرة لمكافحة الأدغال وفي هذا الجانب يشير العديد من الباحثين في إمكانية استخدام هذه المستخلصات كأحد الاستراتيجيات الواعدة في مكافحة الأدغال [17]

اظهرت النتائج ان المجموع الجذري للذرة البيضاء لم يظهر اي فروق معنوية في تاثيره على نسبة الإنبات (جدول 1)، اما المجموع الخضري للذرة البيضاء بتركيز 4% فقد ادى الى انخفاض نسبة الإنبات بشكل معنوي بمقدار 48.00% مقارنة بمعاملة السيطرة التي اعطت اعلى نسبة انبات 98.57% (جدول 1) وهذا لم يتفق مع مادرس من ان اضافة مخلفات الذرة البيضاء (المجموع الجذري والمجموع الخضري) قد اختزلت انبات ونمو الحنطة [18] حيث ان المجموع الخضري للذرة البيضاء هو فقط اظهر تاثيره فقط على انبات بذور نبات خروب الخنزير السام بسبب وجود المركبات السامة في المستخلصات الطبيعية لسيقان الذرة البيضاء والتي شخصت بواسطة جهاز الكروماتوغرافيا عالي الاداء (HPLC) والتي كانت

جميعها ذات طبيعة فينولية [19] والتي اثرت على انبات البذور اكثر من المجموع الجذري للذرة البيضاء.

2- طول النبات (سم)

اظهرت النتائج ان المجموع الجذري لزهرة الشمس بتركيز (2 و 8%) ادى الى انخفاض طول النبات بشكل معنوي بمقدار (78.43 و 78.50سم) مقارنة بتركيز 4% الذي اعطى اعلى طول للنبات 126.10سم (جدول 1) اذ وجدت بعض المركبات المثبطة للإنبات في افرازات جذور نباتات زهرة الشمس والتي قللت الإرتفاع لنباتات فول الصويا والذرة الصفراء والشوفان البري[11,10] ، اما المجموع الخضري لزهرة الشمس بتركيز 2% ادى الى انخفاض في طول النبات بشكل معنوي بمقدار 89.53 سم مقارنة بمعاملة السيطرة التي اعطت اعلى ارتفاع 108.73سم (جدول 1) وهذا تطابق مع ما توصل اليه [20] من ان اضافة 6,3 من مخلفات زهرة الشمس بمجموعها الجذري والخضري قد ثبطت طول النبات لصنفين من الحنطة بنسبة (4.40 و7.24%) للصنف ابو غريب وبنسبة (5.45 و 9.34 %) للصنف اباء، لقد وجد ان إستخدام مستخلص زهرة الشمس ادى الى خفض نمو المجموع الخضري للأدغال المستخدمة في الدراسة بنسبة (33-55 %) وربما يعود الى ان هذه المستخلصات تعيق إمتصاص المواد الغذائية وبدوره يخفض الفعاليات الحيوية ويخفض النمو وتجمع المادة الجافة في الجزء الخضري [21] .

اظهرت النتائج ان المجموع الجذري للذرة البيضاء بتركيز 8% ادى الى انخفاض في طول النبات بشكل معنوي بمقدار 77.07سم مقارنة بمعاملة السيطرة التي اعطت اعلى طول للنبات 110.37سم (جدول 1) ، اما المجموع الخضري للذرة البيضاء بتركيز 8% فقد ادى الى انخفاض في طول النبات بمقدار 64.80سم مقارنة بمعاملة السيطرة التي اعطت اعلى طول للنبات 111.50سم يليه معاملة المجموع الخضري بتركيز 2% والتي اعطت طول 106.03سم (جدول 1) وهذا تطابق مع مادرس عن التأثير الاليلوباثي لمستخلص الأوراق والسيقان والجذور للذرة البيضاء في الادغال في البيت الزجاجي وتبين من الدراسة ان هناك

فعالية للمستخلص على انواع خاصة من الادغال اكثر من الأنواع الأخرى فقد ثبط النمو الخضري لدغل *Ipomoea tribola* بنسبة اكبر من دغل الدهتان *Echinochloa colonum* والدغل *Rotlohllia cochinchineasis* *[22].*

3- عدد الأفرع

اظهرت النتائج ان المجموع الجذري لزهرة الشمس بتركيز 8% ادى الى خفض عدد الأفرع الى 5.333 مقارنة بمعاملة السيطرة التي اعطت اعلى عدد للأفرع 12.667 (جدول 1) اما المجموع الخضري لزهرة الشمس بتراكيز (4 و 8%) ادى الى خفض عدد الأفرع الى 6.333 و 6.667 على التوالي مقارنة بمعاملة السيطرة التي اعطت اعلى عدد للأفرع 11.667 (جدول 1) وهذا لا يتفق مع [23] اذ لاحظ انه عند إضافة مخلفات زهرة الشمس بمجموعها الجذري والخضري الى محصول الشعير زيادة عدد الافرع بنسبة 3.2 عند اضافة المستخلص بنسبة 100% مقارنة مع معاملة السيطرة بنسبة 3.0%.

اظهرت النتائج ان المجموع الجذري للذرة البيضاء بتركيز 4% ادى الى خفض عدد الأفرع بمقدار 6.000 مقارنة بمعاملة السيطرة التي اعطت اعلى عدد للأفرع 11.000 (جدول 1) اما المجموع الخضري للذرة البيضاء بتراكيز(4 و 8%) ادى الى خفض عدد الأفرع الى (9.333 و 8.667) على التوالي مقارنة بمعاملة السيطرة التي اعطت اعلى عدد للأفرع 12.000 يليه معاملة المجموع الجذري بتركيز 2% والتي اعطت 11.667 فرع (جدول 1) وهذا يخالف ما توصل اليه [24] من ان تأثير مخلفات الذرة البيضاء على عدد تفرعات نبات الباقلاء لم يكن معنويا، قد يكون تاثر هذه الصفة بمعاملات اضافة المخلفات الى كون هذه الصفة ترتبط بالتوازن بين الهرمونات في داخل النبات[18] والتي بدورها تعمل على تحفيز أو تثبيط التفرعات .

4- طول السلامية (سم)

اظهرت النتائج ان المجموع الجذري لزهرة الشمس بتركيز (4 و 8%) ادى الى تقليل طول السلامية بشكل معنوي بمقدار (3.8333 و 4.3667سم) على التوالي مقارنة بمعاملة السيطرة التي اعطت اعلى طول للسلامية 8.5333سم (جدول 1)

اما المجموع الخضري لزهرة الشمس بتركيز (2 و 4%) فقد ادى الى تقليل طول السلامية بشكل معنوي بمقدار (3.6667 و 3.6667سم) على التوالي مقارنة بمعاملة السيطرة التي اعطت اعلى طول للسلامية 8.7667سم (جدول 1).

كما ان المجموع الجذري للذرة البيضاء بتركيز 4% ادى الى تقليل طول السلامية بشكل معنوي بمقدار 4.7667سم مقارنة بمعاملة السيطرة التي اعطت اعلى طول للسلامية 8.7667سم (جدول ١) اما المجموع الخضري للذرة البيضاء بتراكيز (2 و 8%) ادى الى تقليل طول السلامية بشكل معنوي بمقدار (4.3333 و 3.7000سم) مقارنة بمعاملة المقارنة التي اعطت اعلى طول للسلامية 8.7000 (جدول 1) حيث اشار[25] الى ان الحوامض الفينولية الناتجة من مخلفات المحاصيل ذات تاثيرات انتخابية وتظهر تأثيراتها بشكل تحفيزي او تثبيطي اعتمادا على التركيز المؤثر وعلى العوامل البيئية اضافة الى إستجابة النبات المستلم والجزء النباتي كما أشار [26] الى وجود عوامل عديدة تؤثر في إظهار الجهد الأليلوباثي وهي الرطوبة والمحتوى المعدني وتركيز الأوكسجين وعدد ونوع الأحياء الدقيقة في التربة وان تأثير المركبات الأليلوباثية يعتمد على طبيعة تركيز واستقرارية هذه المركبات في البيئة إضافة الى مقاومة النبات المستقبل لهذه المركبات [27]

5- دليل المساحة الورقية (سم2)

اظهرت النتائج ان المجموع الجذري لزهرة الشمس بتراكيز (2 و 8%) ادى الى تقليل دليل المساحة الورقية بشكل معنوي بمقدار (4.887 و 7.980سم2) مقارنة بتركيز 4% الذي اعطى اعلى دليل للمساحة ورقية بمقدار 10.823سم2 يليه معاملة السيطرة التي اعطت 10. 673سم2 (جدول 1)االمجموع الخضري لزهرة الشمس بتركيز 2% ادى الى تقليل دليل المساحة الورقية بشكل معنوي بمقدار 4.307سم2 ومتقاربة نوعا ما مع المجموع الخضري لزهرة الشمس بتركيز 8% وبمقدار 6.613سم2 مقارنة بمعاملة السيطرة التي

اعطت اعلى دليل للمساحة الورقية 10.080سم2 (جدول 1) وهذا يتفق مع ماتوصل اليه [28] من ان المساحة الورقية لنبات الحنطة تأثرت بشكل معنوي عند معاملتها بالمستخلصات المائية لزهرة الشمس بما فيها المجموع الجذري والمجموع الخضري.

اظهرت النتائج ان المجموع الجذري للذرة البيضاء بجميع التراكيز ادى الى تقليل دليل المساحة الورقية بشكل معنوي مقارنة بمعاملة السيطرة التي اعطت اعلى دليل للمساحة الورقية 10.283سم2 (جدول 1) في حين ان المجموع الخضري للذرة البيضاء بتراكيز (2 و 4%) ادى الى تقليل دليل المساحة الورقية بشكل معنوي بمقدار (5.140 و 6.053سم2) مقارنة بمعاملة السيطرة التي اعطت اعلى دليل للمساحة ورقية 10.423سم يليه معاملة المجموع الخضري بتركيز 8% 9.280سم2 (جدول 1) وهذا لم يتفق مع[29] في عدم وجود فرق معنوي في دليل المساحة الورقية بين الصنف رابح وانقاذ في الذرة البيضاء عند اضافة مخلفات الذرة البيضاء بمجموعها الجذري والخضري، تمثل الورقة الجزء الأساسي في النبات والمسؤول عن عملية البناء الضوئي في النبات وقد ترتبط الزيادة في المساحة الورقية بزيادة ثابت مقدرة النظام (SCC) والذي يمثل مقدرة النبات على انتاج اكبر كمية من مواد البناء الضوئي وتحويلها الى المصبات في وقت مبكر من دورة حياة المحصول[30] ، ان زيادة المساحة الورقية يعني زيادة في إعتراض الاشعاع الشمسي ومن ثم زيادة معدل صافي البناء الضوئي NAR الى الحد الذي لايسبب تضليل الأوراق السفلى [31] وهذا يعني ان قلة دليل المساحة الورقية يعني قلة في اعتراض الإشعاع الشمسي ومن ثم نقصان معدل صافي البناء الضوئي الى الحد الذي يسبب تضليل الأوراق السفلى كما ان قلة اعتراض الأشعة الشمسية من قبل اوراق النبات يقلل من قابلية النبات على منافسة الأدغال وتقليل تأثيرها .

جدول (1) تأثيراضافة المستخلصات المائية لزهرة الشمس والذرة البيضاء في صفات النمو

نوع النبات	نوع المستخلص	التركيز %	نسبة الانبات %	ارتفاع النبات سم	عدد الافرع	طول السلاميه سم	دليل المساحه الورقيه سم
زهرة الشمس	مجموع جذري	%2	45.93b	78.43c	6.667c	5.6000b	4.887b
		%4	97.07a	126.10a	11.333b	3.8333c	10.823a

		%8	37.67c	78.50c	5.333d	4.3667c	7.980ab
		السيطره	100.00a	104.63b	12.667a	8.5333a	10.673a
	مجموع خضري	%2	56.43b	89.53c	7.667b	3.6667c	4.307c
		%4	97.90a	105.70a	6.333c	3.6667c	8.767ab
		%8	100.00a	98.53b	6.667c	5.8333b	6.613bc
		السيطره	99.33a	108.73a	11.667a	8.766a	10.080a
ذرة بيضاء	مجموع جذري	%2	92.53a	91.10b	8.000b	5.3667b	5.537b
		%4	91.40a	95.20b	6.000c	4.7667c	4.400b
		%8	93.50a	77.07c	7.333b	5.6333b	6.913b
		السيطره	98.57a	110.37a	11.667a	8.7667a	10.283a
	مجموع خضري	%2	56.27c	106.03a	11.667a	4.3333c	5.140b
		%4	48.00d	82.33b	9.333b	5.6000b	6.053b
		%8	90.47b	64.80c	8.667b	3.7000c	9.280a
		السيطره	98.57a	111.50a	12.000a	8.7000a	10.423a

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الوزن الجاف للمجموع الخضري (غم)

اظهرت النتائج ان المجموع الجذري لزهرة الشمس بتركيز 8% ادى الى انخفاض الوزن الجاف بشكل معنوي للمجموع الخضري بمقدار 1.6333غم مقارنة بمعاملة السيطرة التي اعطت اعلى وزن جاف 6.0333 غم (جدول 2) اذ وجدت بعض المركبات المثبطة للإنبات في إفرازات جذور نباتات زهرة الشمس والتي قللت الوزن الجاف والطري لنباتات فول الصويا والذرة الصفراء والشوفان البري [11,10] ، اما المجموع الخضري لزهرة الشمس بتركيز 8% فقد ادى الى خفض الوزن الجاف للمجموع الخضري بشكل معنوي بمقدار 2.9333 غم مقارنة بمعاملة السيطرة التي اعطت اعلى وزن جاف 6.0333غم (جدول 4) وهذا يتفق مع [32] من ان اضافة مستخلص المجموع الخضري لزهرة الشمس الى بذور الادغال رفيعة الاوراق النابتة ثبطت الأوزان الجافة للمجموع الجذري والخضري وبنسبة 66.30 %.

اظهرت النتائج ان المجموع الجذري للذرة البيضاء بتركيز (2 و 8%) ادى الى تقليل الوزن الجاف للمجموع الخضري بشكل معنوي بمقدار (1.4333 و 1.6333غم) مقارنة بمعاملة السيطرة التي اعطت اعلى وزن جاف 6.1000غم (جدول 2)، اما المجموع الخضري للذرة البيضاء بتركيز 2% فقد ادى الى خفض الوزن الجاف للمجموع الخضري بشكل معنوي بمقدار 2.1667غم مقارنة بمعاملة المقارنة التي اعطت اعلى وزن جاف 6.000غم (جدول 2)، اذ لوحظ ان رش مستخلص الذرة البيضاء على ادغال الماش بعد (45و30و15 يوما) من الزراعة اختزل الوزن الجاف لدغل البربين *Pratulaca oleracea* والمديد بنسبة (60 و75 %) على التوالي بينما لم تؤثر في دغل *Trianthema portulacastrum* [33].

7- الوزن الجاف للمجموع الجذري (غم)

اظهرت نتائج الدراسة الحالية ان المجموع الجذري لزهرة الشمس بتركيز 8% ادى الى خفض الوزن الجاف للجذور بشكل معنوي بمقدار 0.2167غم مقارنة بمعاملة السيطرة التي اعطت اعلى وزن جاف 0.9700غم (جدول 2)، اما المجموع الخضري لزهرة الشمس بتركيز 8% ادى الى خفض الوزن الجاف للجذور بشكل معنوي بمقدار 0.3067غم مقارنة بمعاملة السيطرة التي اعطت اعلى وزن جاف 1.1933غم (جدول 2) اذ ان مستخلصات زهرة الشمس بمجموعها الجذري والخضري سببت قلة طول الجذور لتأثيرها في زيادة الإنزيم المحلل للأوكسين الذي يترتب عليه قلة نمو الجذور وتفرعها وبالتالي انخفاض وزنها الجاف [34].

اظهرت النتائج ان المجموع الجذري للذرة البيضاء بتراكيز (2 و 4%) ادى الى خفض الوزن الجاف للجذور بشكل معنوي بمقدار (0.3033 و 0.2833غم) مقارنة بمعاملة السيطرة التي اعطت اعلى وزن جاف 1.0367غم (جدول 2)

اما المجموع الخضري للذرة البيضاء فقد ادى الى خفض الوزن الجاف للجذور بشكل معنوي بتراكيز (2 و 4%) بمقدار (0.32333و0.30333غم) مقارنة بمعاملة السيطرة التي

اعطت اعلى وزن جاف 0.94667غم (جدول 4) وهذا يتفق مع دراسة حديثة تتضمن إضافة مخلفات الذرة البيضاء (المجموع الجذري والمجموع الخضري) لنبات الحنطة قد اختزلت الوزن الجاف للبادرات وقد حققت مخلفات المجموع الجذري للذرة البيضاء اعلى خفض للوزن الجاف بعد 60 يوم للدغل ابو دميم بنسبة 13.08% على التوالي وللشوفان البري بنسبة 62.20% على التوالي قياسا بمعاملة المقارنة[18].

8- عدد الثمار

اظهرت النتائج ان المجموع الجذري لزهرة الشمس بتركيز 2% ادى الى عدم حدوث الإثمار مقارنة بمعاملة السيطرة التي اعطت اعلى عدد للثمار 8.0000 (جدول 2)، اما المجموع الخضري لزهرة الشمس بتراكيز (4 و 8%) ادى الى عدم حدوث الإثمار مقارنة بمعاملة السيطرة التي اعطت اعلى عدد للثمار 8.333 (جدول 2) اذ ان صفة عدد القرنات بالنبات ترتبط بشكل مباشر بعدد الأزهار العاقدة بالنبات وان اي عامل يؤثر في زيادة عدد الأزهار العاقدة وبقائها سوف ينعكس ايجابيا على حاصل البذور [35]، كما اظهرت النتائج ان المجموع الجذري للذرة البيضاء ولجميع المعاملات ادى الى خفض عدد الثمار مقارنة بمعاملة السيطرة التي اعطت اعلى عدد للثمار 8.0000 (جدول 2)، اما المجموع الخضري للذرة البيضاء بتركيز 8% ادى الى عدم حدوث الإثمار مقارنة بمعاملة المقارنة التي اعطت اعلى عدد للثمار 8.333 (جدول 2) وهذا يتفق مع [19] اذ ان التأثير المعنوي لإضافة مخلفات الذرة البيضاء ادى الى زيادة عدد القرنات لنبات الباقلاء و كان عددها عند إضافة 760 غم مخلفات\ م2 بلغت (70.4 قرنةام2) قياسا بمعاملة عدم إضافة مخلفات والتي بلغت (52.5 قرنة \ م2) قياسا بمعاملة السيطرة .

9- طول الثمرة (سم)

اظهرت النتائج ان المجموع الجذري لزهرة الشمس بتركيز 4% ادى الى تقليل طول الثمرة بشكل معنوي بمقدار 7.500سم مقارنة بمعاملة السيطرة التي اعطت اعلى طول للثمرة 10.333 سم (جدول 2) اما المجموع الخضري لزهرة الشمس بتركيز 2% ادى الى تقليل طول الثمرة بشكل معنوي بمقدار 8.167سم مقارنة بمعاملة السيطرة التي اعطت اعلى

طول للثمرة 11.167 (جدول 4) اذ وجد [36] ان نتائج التحليل لجهاز الفصل الكروماتوغرافي السائل عالي الاداء لمخلفات زهرة الشمس المضافة الى التربة وجود 10 مركبات كيمياوية جميعها احماض فينولية معروفة بقدرتها الأليلوباثية العالية وبالتالي اثرت على انتاج الثمار وتقليل طولها.

اظهرت النتائج ايضا ان المجموع الجذري للذرة البيضاء بتراكيز(4 و 8%) ادى الى تقليل طول الثمرة بشكل معنوي بمقدار (8.467 و 8.167سم) مقارنة بمعاملة السيطرة التي اعطت اعلى طول للثمرة 10.700 (جدول2)، اما المجموع الخضري للذرة البيضاء بتراكيز(2 و 4%) ادى الى تقليل طول الثمرة بشكل معنوي بمقدار (9.500 و 8.667سم) مقارنة بمعاملة السيطرة التي اعطت اعلى طول للثمرة 10.900 (جدول 4) وهذا تطابق مع دراسة توصل اليها[37] اذ وجد ان المستخلصات المائية لمخلفات الذرة البيضاء اثرت في إنتاج البذور لمحاصيل الحنطة والجت والشوفان واوصى الباحثون بضرورة إزالة مخلفات الذرة البيضاء من الحقل خاصة عند زراعة محصول الحنطة والمحاصيل الاخرى الحساسة للسموم النباتية وقد جد انه عند ترك مخلفات الذرة البيضاء بعد الحصاد لمحصول الشوفان يؤدي الى اختزال الأدغال التي تعقبها في الدورة الزراعية بنسبة عالية فضلا عن الأهمية الكبيرة لهذا النظام من الزراعة بزيادة المادة العضوية ومنع التربة من التعرية والحفاظ على درجة حرارة التربة وخاصة في المناطق الباردة ومن ناحية اخرى تمكن الباحث من زراعة بعض المحاصيل البقولية غير الحساسة للتاثير الاليلوباثي للذرة البيضاء والحصول على انتاجية عالية [38] .

جدول 2 يوضح اضافه المستخلصات المائيه لزهره الشمس والذره البيضاء

نوع النبات	نوع المستخلص	التركيز %	الوزن الجاف للمجموع الخضري (غم)	الوزن الجاف للمجموع الجذري (غم)	عدد الثمرات	طول الثمرة(سم)
زهرة الشمس	مجموع جذري	%2	2.7333c	0.4833b	0.000c	0.000d
		%4	4.5667b	0.5067b	4.000b	7.500c
		%8	1.6333d	0.2167c	5.0000b	9.167b
		السيطرة	6.0333a	0.9700a	8.0000a	10.333a

	مجموع خضري	%2	5.1667b	0.8167b	4.000b	8.167b
		%4	3.8667c	0.8133b	0.0000c	0.000c
		%8	2.9333d	0.3067c	0.0000c	0.000c
		السيطرة	6.0333a	1.1933a	8.000a	11.167a
ذرة بيضاء	مجموع جذري	%2	1.4333c	0.3033c	4.0000b	9.167b
		%4	2.4667b	0.2833c	4.000b	8.467c
		%8	1.6333c	0.4100b	4.000b	8.167c
		السيطرة	6.1000a	1.0367a	8.0000a	10.700a
	مجموع خضري	%2	2.1667d	0.32333c	7.0000b	9.500b
		%4	2.8667c	0.30333c	4.000c	8.667b
		%8	4.6000b	0.50667b	0.0000d	0.000c
		السيطرة	6.0000a	0.94667a	8.000a	10.900a

الاستنتاجات

1 – تاثر جميع الصفات الحقليه لنبات خروب الخنزير بالمستخلصات المائيه لنباتي زهره الشمس والذره البيضاء

2- اظهرت المستخلصات المائيه لزهره الشمس والذره البيضاء تاثيرا اليلوباثيا في الوزن الجاف للمجموع الجذري والخضري لنبات خروب الخنزير

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Preparation and Spectral identification of new complexes of some Transition metal ions (Bivalent) with Schiff- Mannich base ligands Derived from Isatin.

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Featured Application: The biological activity of the ligands prepared with the complexes under study will be studied, new complexes will be prepared with other metal ions, and a theoretical study (molecular Modeling) will be conducted to determine the effective sites of the prepared complexes as drugs .

Abstract: The Heterocyclic ligands[(Z)-3-((2-hydroxy-5-methyl phenyl) imino)-1-(piperazin -1-ylmethyl)indolin-2-one] (3-HMIPI) and (Z)-3-hydroxy-4-((2-oxo-1-(piperazin-1-ylmethyl)indolin-3-ylidene)amino)benzenesulfonamide] (4-HOPIAB) prepared from the condensation of 2- Amino-5-methylphenol with Isatin in order to prepare the Schiff base compound namely [(3Z)-3-[(2-hydroxy-4-methylphenyl)imino]-1,3-dihydro-2H-indol-2-one] (3-HMIDI) , followed by the reaction of the resulting compound (3-HMIDI) with Piperazin while the second ligand prepared from the condensation of 4-amino-3-hydroxybenzenesulfonamide with Isatin in order to prepare the Schiff base compound namely [(3-hydroxy-4-{[(3Z)-2-oxo-1,2-dihydro-3H-indol-3-ylidene]amino} benzenesulfonamide] (3-HDAB) , followed by the reaction of the resulting compound (3-HDAB) with Piperazin . Various analytical and characterization techniques in the study of preparative ligands, including (mass spectrometry, UV-Vis spectroscopy, and CHN elemental analysis). A novel solid metallic complexes of these ligands with Co (II) Ni (II) , and Cu (II) were prepared. Based on the analytical data, (1:2) metal to ligand ratio . All metallic complexes were identified by various techniques including (FT- IR and UV.-Vis. spectroscopy, flame atomic absorption spectroscopy, CHN element analytic data , The percent of magnetic susceptibility and molar conductivity of metal ions in the prepared complexes and metal complexes dissolved in DMSO at a laboratory temperature of 1 × 10-3 M were also studied. The results of these studies indicate that the Schiff-Mannich base ligand with Co(II), Ni(II), and Cu(II) (3-HMIPI) should pass through the nitrogen atom of the azomethine group of the Schiff moiety, besides oxygen atom of Isatin moiety while the Schiff -Mannich base ligand (4-HOPIAB) with Co (II), Ni (II) and Cu (II) was to pass through nitrogen atom of azomethine group of Schiff moiety, besides oxygen atom of Hydroxyl . The spectra of Electronic transition for the complexes and the magnetic sensitivity data expect an octahedral configuration of the newly complexes and they showed that had no electrolytic properties.

Keywords: Schiff – Mannich base ligands; Isatin derivatives ; Metal complexes.

1. Introduction

Isatin compounds and their derivatives have very important biological activity. They have been used as antibiotics for bacteria, fungi, as a treatment for some malignant diseases, and an antibiotic for HIV [1]. Isatin is an Indole derivatives type α,β di ketone containing two groups of carbonyl(C=O) at position 2 and 3 in the ring1[2] . It was produced for the first by Erdman and Laurent in the year 1841 [3].This kind of α,β di ketone compound is a multi-biological active founded to exhibition the inhibition of tyrosine kinase [4] and were having an significant heterocyclic compound group which is important in medical chemistry [5].

The imines are derivative from Isatin and amine compounds , are type of compounds that contain two donor groups that can coordinate with metal ions, namely the azomethine group the oxygen atom of the carbonyl group in Isatin [6,7].

Schiff - Mannich base compounds are a newly branch of organic compounds that are receiving increasing attention in scientific investigation [8] , compared to Schiff base compounds and Mannich bases as they contain two active groups (-NH=C-) and (-N-C-N-) [1,9]. The Schiff – Mannich base ligands are considered of importance due to their electronic properties, structural flexibility and selectivity towards metal ions [10].

These compounds can coordinate in many ways. They can be coordinated via nitrogen atom of azomethine group [11], or can coordinate via nitrogen atom (azomethine) and the oxygen atom of the carbonyl group in Isatin [12]. At the present time Schiff - Mannich base compounds are showing remarkable applications in all areas of life including industrial, biological and analytical fields[13,14] , because they contain the two groups mentioned above [2], as they have been used in the industrial field as antioxidants [15], and to prevent corrosion [16]. Due to the emergence of cancer tumors that are highly resistant

to the effectiveness of traditional chemotherapies, it has become interesting to discover different therapeutic approaches including the development of new active drugs against resistant cancers [17]. As well as Schiff - Mannich base complexes have proven their worth as antifungals and antibacterial [18].

2. Materials and Methods

The chemicals were pick up from merck , GCC, BDH, and Sigma-Aldrich . Melting points determination of the ligands and their metallic complexes by using a Model 9300. The recorded UV.-Vis. spectra were done by a dual-band spectrophotometer of Shimadzu Model 1700 . Magnetic susceptibility data by using the Faraday method were done on a balanced magnet type MSB-MKI . FT-IR spectra were recorded on a Shimadzu FTIR 8400 spectrometer in the wavelengths (4000–400) cm −1 using KBr particles . CHN elemental analysis was performed using EURO 2012EA 300 CHN elements .

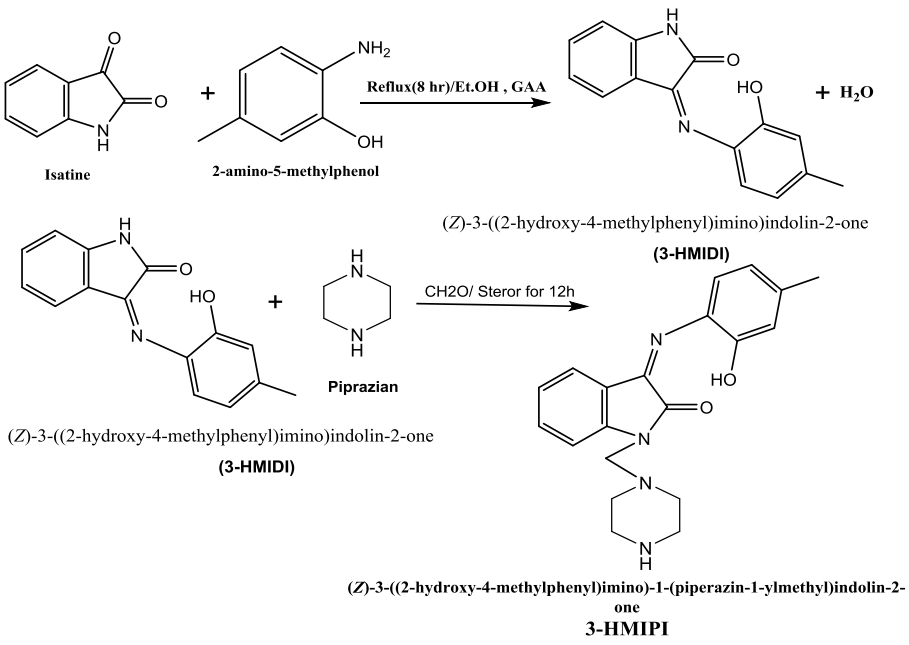
2.1. Preparation of the Schiff – Mannich base ligands (3-HMIPI) and (4-HOPIAB):

2.1.1 Schiff bases derivatives (3-HMIDI) and (3-HDAB)(1):

Schiff base derivatives were prepared by reacting isatin (0.002 mol) and (0.002 mol) aromatic amine derivatives as catalysts in 2-3 drops of glacial acetic acid. The mixture was refluxed at 73 °C for 10 h to prepare derivatives of Schiff bases (3-HMIDI) and (3-HDAB) [2,12], which were synthesized from absolute ethanol as shown in Scheme (1) and Scheme (2) .

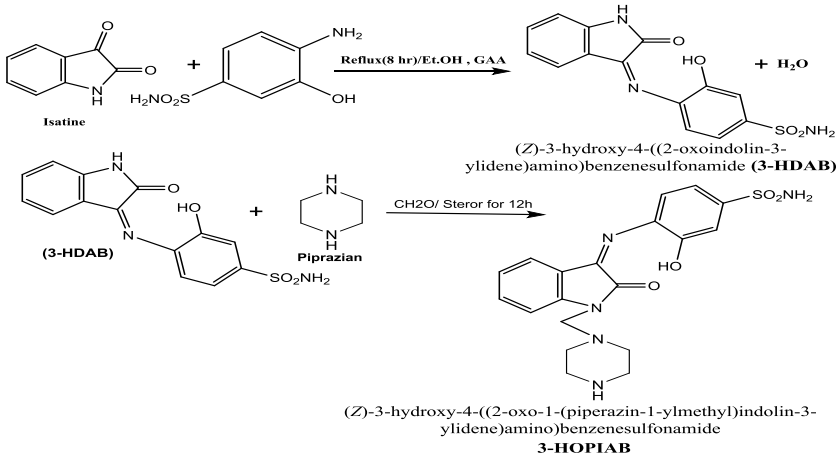
2.1.2. Schiff – Mannich base ligands:

Schiff – Mannich base ligands were produced by the reaction of formaldehyde with Schiff base derivatives (3-HMIDI) and (3-HDAB) (0.01 mol), piperazine was employed in a round bottom flask, by dissolving it in (30 ml) of ethanol [2]. The solution stirred for 12 h. , after that the reaction mixture put in storage in the fridge-freezer for 48 h. , and then recrystallized from absolute ethanol to obtain the Mannich base derivative (Schiff-Mannich base ligand (3-HMIPI) and (4-HOPIAB) were prepared according to scheme (1) and scheme (2).



Scheme 1. This is a Scheme of Synthesis of interaction pathway Schiff – Mannich base

ligand (3- HMIPI).



Scheme 2 . This is a Scheme of Synthesis of interaction pathway Schiff – Mannich base

ligand (4- HOPIAB).

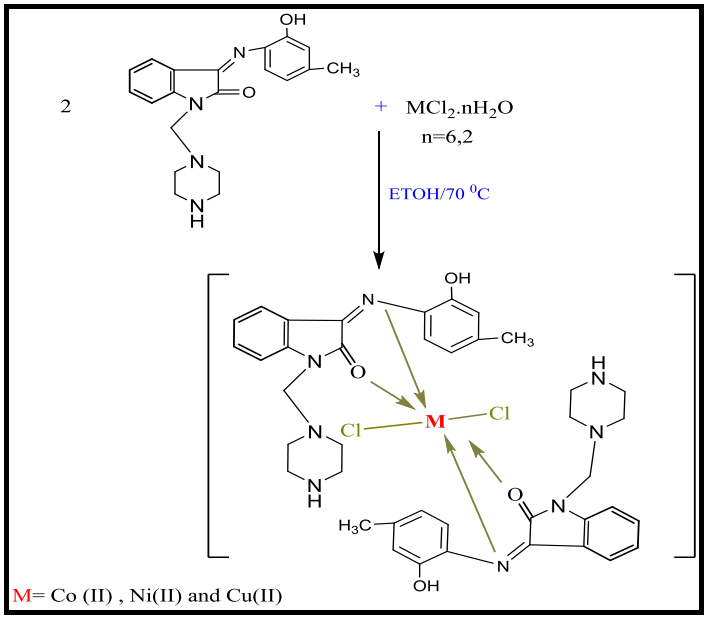
The physical properties of the two ligands had listed in Table 1.

2.2. Synthesis of metal complexes:

By adding (0.001 mol) for each of ($CoCl_2.6H_2O$, $NiCl_2.6H_2O$, and $CuCl_2.2H_2O$) in 15 mL of absolute ethanol with 15 mL of Schiff– Mannich base ligand dissolving in absolute ethanol (0.724 g, 0.002 mol, and 0.830 g, 0.002 mol) in (1:2) ratio (metal: ligand)[11]. The resultant mixtures were refluxed for one hour. The complexes produced were isolated by evaporation, filtered off and dried under vacuum. The physical properties of the studied complexes were listed in Table 1. Schemes 3 and 4 illustrate the procedure steps for preparing metal complexes with two ligands.

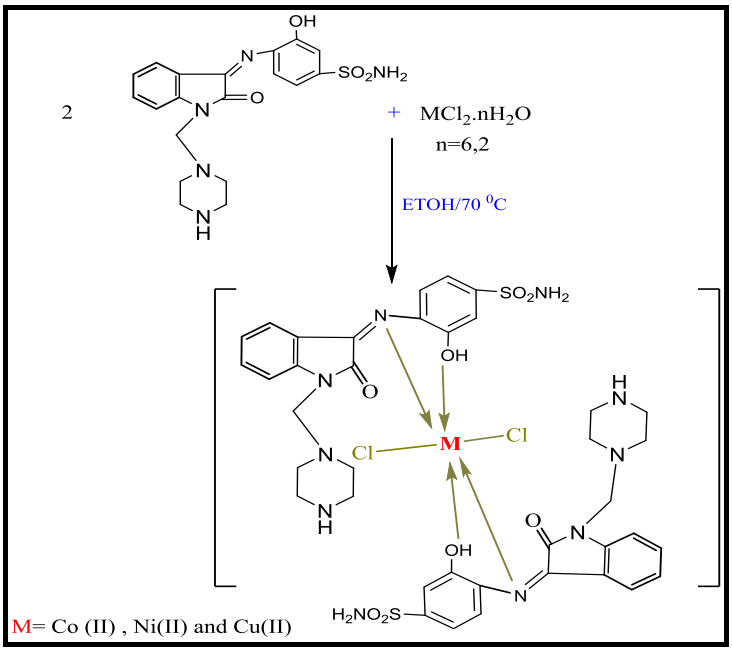
Table 1 . This is a Table of Physical properties of Schiff-mannich base ligands and their novel metal complexes.

No	Chemical formula	Color	M.Wt g/Mole	M.P°C	Yield%	Rf.
١	3- HMIPI=.$C_{20}H_{22}N_4O_2$	Orange	350	239-241	67	0.76
٢	$[Co(C_{20}H_{22}N_4O_2)_2Cl_2]$	Dark Brawn	830.68	163-166	85	0.52
٣	$[Ni\ (C_{20}H_{22}N_4O_2)_2Cl_2]$	Dark Purple	830.44	170-173	81	0.51
٤	$[Cu(C_{20}H_{22}N_4O_2)_2\ Cl_2]$	Brawn	835.29	210-212	89	0.54
٥	4- HOIAB=$C_{19}H_{21}N_5O_4S$	Yellow	415.47	218-220	85	0.7
٦	$[Co(C_{19}H_{21}N_5O_4S)_2Cl_2]$	Red	960.77	163-166	79	0.66
٧	$[Ni\ (C_{19}H_{21}N_5O_4S)_2Cl_2]$	Dark Purple	960.53	170-173	80	0.66
8	$[Cu(C_{19}H_{21}N_5O_4S)_2\ Cl_2]$	Dark Blue	965.38	260-280	77	0.59



Scheme 3. This is a Scheme of Synthesis of interaction pathway of the new metal complexes with

the ligands (3- HMIPI)



Scheme 4 . This is a Scheme of Synthesis of interaction pathway of the new metal complexes with

the ligands (4-HOPIAB

3. Results

The complexes were solubility examined in different solvents : DMF, DMSO, methanol and ethanol. They were air stable . Ligands and their metal complexes were characterized by elemental analysis, molar conductivity, magnetic susceptibility, FTIR, and UV-Vis. The analytical data (C, H, N, S) of the complexes are consistent with the experimental data. The data shows (1:2) (M:L) ratio, as shown in Table 2. The magnetic susceptibility of the chelating complexes at 298 ^{0}C . The octahedral geometry were predicted .The nature of chelate complexes in this work showed low conductivity values. These proved that the complexes were non-electrolytic.

Table 2 .This is a Table of The Elements Analysis data for the Schiff – Mannich base ligands and their metallic complexes.

No	Form.	Calc.(Experimental) %				
		C%	H%	N%	S%	M%
١	3- HMIPI=.$C_{20}H_{22}N_4O_2$	68.55 (68.29)	6.33 (5.93)	15.99 (15.69)	----- -----	----- -----
٢	$[Co(C_{20}H_{22}N_4O_2)_2Cl_2]$	57.84 (57.91)	5.34 (5.49)	13.49 (13.81)	----- -----	7.09 (7.42)
٣	$[Ni\ (C_{20}H_{22}N_4O_2)_2Cl_2]$	57.85 (57.93)	5.34 (5.21)	13.49 (13.92)	----- -----	7.07 (7.35)
٤	$[Cu(C_{20}H_{22}N_4O_2)_2\ Cl_2]$	57.52 (57.47)	5.31 (5.62)	13.42 (13.26)	----- -----	7.61 (7.80)
٥	4- HOIAB=$C_{19}H_{21}N_5O_4S$	54.93 (54.55)	5.09 (5.39)	16.86 (16.95)	7.72 (7.95)	----- -----
٦	$[Co(C_{19}H_{21}N_5O_4S)_2Cl_2]$	47.51 (47.16)	4.41 (4.23)	14.58 (14.42)	6.67 (6.55)	6.13 (6.44)
٧	$[Ni\ (C_{19}H_{21}N_5O_4S)_2Cl_2]$	47.52 (47.92)	4.41 (4.69)	14.58 (14.59)	6.68 (6.75)	6.11 (6.23)
8	$[Cu(C_{19}H_{21}N_5O_4S)_2Cl_2]$	47.28 (47.82)	4.39 (4.51)	14.51 (14.92)	6.64 (6.55)	6.58 (6.88)

3.1 FTIR Spectra studies:

The FTIR spectra compartment between the complexes with the ligands to determine the changes occurred through the Complexes formation [12,18], the spectra data were registered in tables (3) and (4).

3.1.1. FTIR Spectra studies of the ligand (3-HMIPI) and its new complexes :

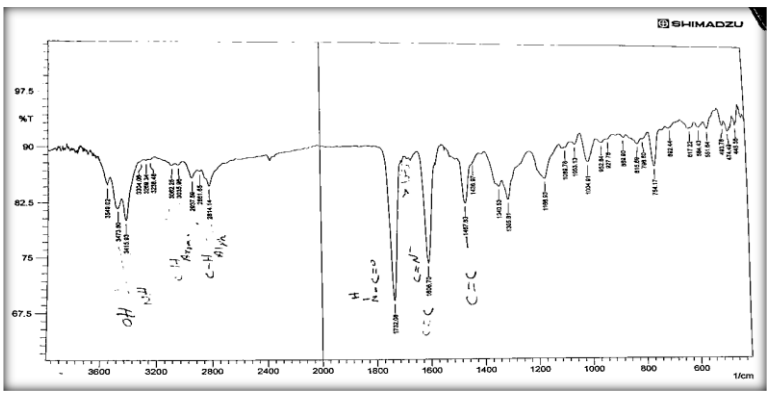
Figures from (1) to (3) show the spectrum for the ligand (3-HMIPI) and its metallic complexes with both cobalt and nickel (Bivalent). These spectra showed a group of bands of different intensities The shape and location are like strong elastic bands due to the v(C=O) carbonyl groups present within the Isatin ring and the (N-H)v band of the Pipyridine ring, as well as the aromatic (C=C)v band, which is confined to a range of less than 1750 cm. [2], as well as a group of other bands present in those spectra. When the spectrum of the ligand was compare with its metallic complexes , it was found that the spectrum of the ligand was showing strong stretching bands due to the carbonyl groups at the (4, 2) position within the isatin ring, and these bands were almost constant in the prepared complexes spectra , which were in v (1732) Cm^{-1}. As well, a wide vibration band performed at the frequency 3415 cm^{-1}, which recognized to the Pipyridine molecule in stretching of v(N-H) bond . No major changes was observed in the shape or position or intensity of this band when matched with the metallic complexes spectra.

The ligand (3-HMIPI) spectrum also was showing a strong stretching band at1726 cm^{-1}, which was predictable to the stretching vibration band belong to the v(NHC=O) imide bond of the Isatin ring. The carbonyl group in the coordination process with ions in order to chelated complexes formation [7]. Also the ligand spectrum was showing a band at 1675 cm^{-1}, which was predictable to the stretching vibration of the v(C=N) bond. The Non- bonding pair electrons of the nitrogen atom of this group with the metal ions under study. As listed in Table 3. The FTIR spectra data of the Schiff- Mannich base ligand(3-HMIPI) and Its metallic complexes in cm^{-1} units.

Table 3 . This is a Table of FTIR spectra data of the Schiff- Mannich base ligand(3-HMIPI) and Its metallic complexes calculated in cm^{-1} units .

Compounds	N - H	C – H Ar.	O - H	C -H alph	C═ O	C═ N	C═ C	M–N
C20H22N4O2	٣٤١٥،٩٣	3082,25 3035,96	3473, 80	2937,59 2814,14	1737	1675	1467,83 1606,70	---
[Co(C20H22N4O2)2Cl2]	,08 ٣٤١٢	3089,96 3035,96	---	2941,44 2846,93	1734	1662,64	1604,77	540,07
[Ni(C20H22N4O2)2Cl2]	3414,00	---	---	---	1746	1668,43	1604,77	522,71

Figure 1. This is a figure of FTIR-spectra of the ligand (3-HMIPI)



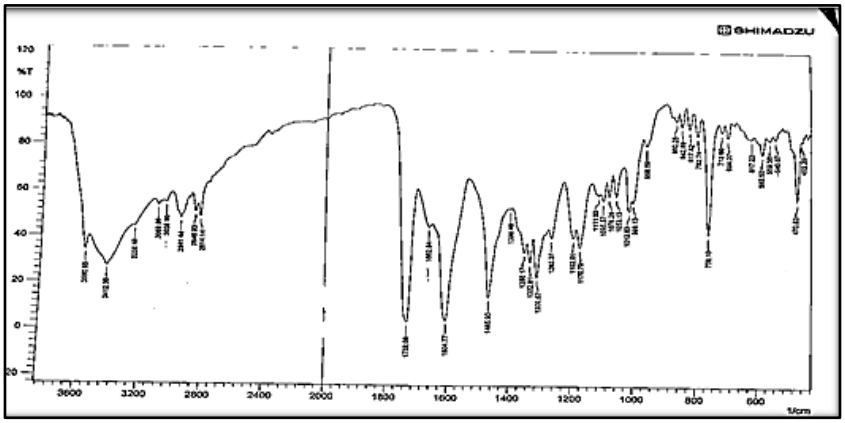


Figure 2. This is a figure of FTIR-spectra of the ligand (3-HMIPI) with Co(II).

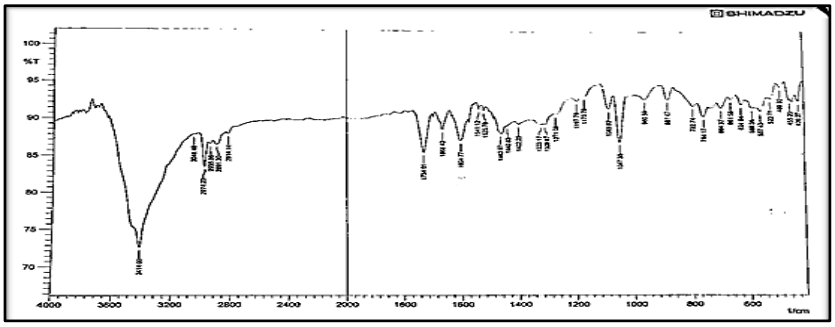


Figure 3. This is a figure of FTIR-spectra of the ligand (3-HMIPI) with Ni (II).

3.1.2 FTIR Spectra of the ligand (4-HOPIAB) and its new complexes :

Figures from (4) to (7) show the spectrum of the ligand (4- HOPIAB) and its metallic complexes with cobalt, nickel and copper (Bivalent). These spectra showed a groups of different bands intensity, shape or location.

The compartment between the spectrum of the ligand with its metallic complexes was found that the ligand spectrum showed strong stretching bands of intensity due to the carbonyl groups within the Isatin ring. Ligand spectrum (4-HOPIAB) shows that was strong stretching band at 1606 cm^{1-}, which was predictable to the band (C = N) .The nitrogen of azomethine group in the coordination process [19,20] with metallic ions in order to chelated complexes formation .

Also The ligand spectrum was showing a strong band at 3199cm^{-1}, which was predictable to the v(OH) stretching vibration bond. Position changes or shape of this band was distinguished with the spectra of metallic complexes , which may indicate the coordination happening between the pair of electrons of this oxygen atom with the metal ions under study [7,12].

The metal complexes spectra showed newly weak absorptions intensity at (497-567) cm^{-1} and (445-476) cm^{-1} ,while ligand spectrum devoid of them. These bands were predictable to the (M–N) and (M–O) bands, correspondingly [20,21]. Table 4 shows the results of the spectra study of ligand(4-HOPIAB) and its cobalt (II), nickel (II) and copper (II) metallic complexes ions.

Table 4 . This is a Table of FTIR spectra for Schiff- Mannich base ligand (4-HOPIA B) and Its metallic complexes in cm^{-1} units.

Compounds	O - H[1]	C-H Aro.	C-H Alph.	C = O	C = N	O - H	C= C	M-N	M - O
$C_{19}H_{21}N_5O_4S$	3490	3022	2922	1737	1606	3442	1670 1467	---	---
$[Co(C_{19}H_{21}N_5O_4S)_2Cl_2]$	3525	---	---	1737	1602	3442	1463	497	445
$[Ni(C_{19}H_{21}N_5O_4S)_2Cl_2]$	3545	3053 3028	2949 2833	1737	1668	----	1462 1608	567	466
$[Cu(C_{19}H_{21}N_5O_4S)_2Cl_2]$	3545	3055	2922 2848	1737	1610	3545	1462,04	530 ,42	476

Figure 4. This is a figure of FTIR- spectra of the ligand (4-HOPIAB)

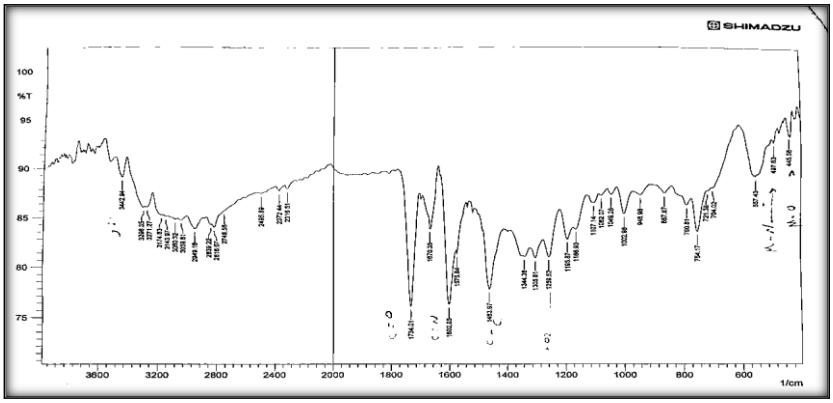


Figure 5. This is a figure of FTIR- spectra of the ligand (4-HOPIAB) with Co(II).

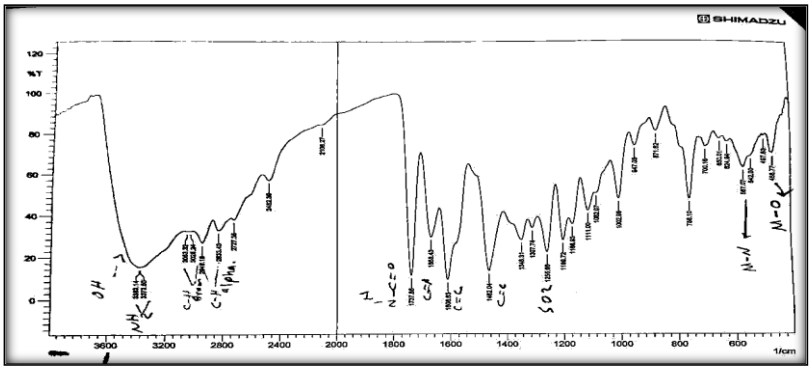


Figure 6. This is a figure of FTIR-spectra of the ligand (4-HOPIAB) with Ni (II).

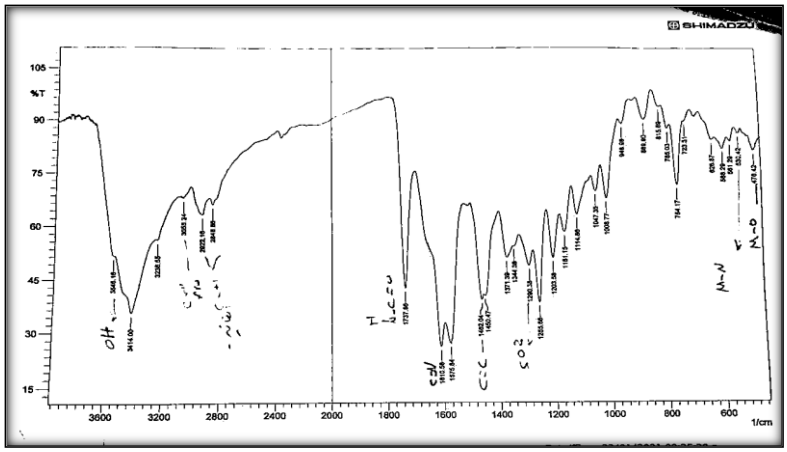


Figure 7. This is a figure of FTIR-spectra of the ligand (4-HOPIAB) with Cu(II).

3.2 Magnetic susceptibility data :

The magnetic susceptibility results listed in the Table 5 . The value of magnetic moment for Co(II) ,Ni (II) and Cu(II) Complexes indicated presence of the paramagnetic characteristic [19].

3.3 Molar Conductivity Measurements :

By the resulting data acquired, it was obvious that the measurements of molar electric conductivity for the metallic complexes solutions in concentration of (1×10^{-3}) molar at the laboratory temperature and by using DMSO solvent , ranged between (9.61-13.10) S. $cm^2.mol^{-1}$and the data of these Measurements tableted in Table 5.The lack of ionic characters of these complexes were obvious. These resulting data were matching to what was detailed in the collected works for metallic complexes [20].

Table 5. This is a Table of Magnetic susceptibility and Molar Conductivity values .

Compounds	μ_{eff} (B. M)	Conductivity S.mol $^{-1}$. Cm^2
$[Co(C_{20}H_{22}N_4O_2)_2Cl_2]$	4.90	13.10
$[Ni\ (C_{20}H_{22}N_4O_2)_2Cl_2]$	3.03	9.61
$[Cu(C_{20}H_{22}N_4O_2)_2\ Cl_2]$	1.78	17.88
$[Co(C_{19}H_{21}N_5O_4S)_2Cl_2]$	4.81	9.56
$[Ni\ (C_{19}H_{21}N_5O_4S)_2Cl_2]$	3.41	11.69
$[Cu(C_{19}H_{21}N_5O_4S)_2Cl_2]$	1.76	10.81

3.4 Electronic Transition spectra studies:

The electronic transitions spectra are very valuable in the assessment of effects equipped as a compare to other techniques of essential investigations.

Figure 8. ligand (3-HMIPI) spectrum in (DMSO) solvent showed three absorption peaks, two at (٢٩٤nm, ٣٤٠١٣,٦٠ cm-1) and (٢٤٤nm, 40983.60 cm-1) due to the electron transition of the type ($\pi \rightarrow \pi^*$) while the third peak was attributed at (426 nm, 23474.17cm-1) to the electron transition ($n \rightarrow \pi^*$) due to the ligand having double bonds with atoms having unshared electron pairs [22,23].

The ligand spectrum was compared with cobalt (II) complex ion , which was show peak at (535 nm, 18691.58 cm^{-1}) has been recognized to the electron transition , $\nu 3 = {}^4T_1g\ (F) \rightarrow {}^4T_1g\ (P)$ This fact is consistent with the literature on the presence of this band in octahedral cobalt(II) complexes ions [24].

The UV-visible of nickel (II) complex solution spectrum recorded an absorption peak at (561 nm, 17825.31cm^{-1}) has been attributed to the electron transition $\nu 3 = {}^3A_2g(F) \rightarrow {}^3T_1g\ (P)$ and this is consistent with what was mentioned in the literature regarding octahedral nickel(II) complexes [25,26].

The UV-visible of Copper (II) spectrum was show peak at (461 nm, 21691.97 cm^{-1}) due to the to the electron transition (($^2Eg \rightarrow {}^2T_2g$), and This is similar to previous researches [26]. The spectra were red-shifted in complexes, suggesting an octahedral geometry around metallic ions (II) in the complexes as presented in Figures 9 and 10 .

The spectrum in Figure11 of the ligand (4-HOPIAB) in solvent (DMSO) showed three absorption peaks, two at (225nm, 40983 cm^{-1}) and (295nm, 34013 cm^{-1}) due to the electron transition of the type ($\pi \rightarrow \pi^*$) while the third peak was attributed at (424 nm, 23474cm^{-1}) to the electron transition ($n \rightarrow \pi^*$) due to the ligand having double bonds with atoms having unshared electron pairs [23].

The ligand spectrum was compared with that of cobalt (II), which showed a peak at (539 nm, 18552 cm^{-1}) has been recognized to the electronic transition , $\nu 3 = {}^4T_1g\ (F) \rightarrow {}^4T_1g\ (P)$ This fact is consistent with the literature on the presence of this band in octahedral cobalt(II) complexes ions [24].

The UV-visible of nickel (II) complex solution spectrum recorded an absorption peak at (558 nm, 17921cm^{-1}) has been attributed to the electronic

transition v3=$^3A_2g(F)\rightarrow{}^3T_1g$ (P) and this is consistent with what was declared in the collected works as regards of octahedral shape in Nickel(II) complexes[25].

While the UV-visible of copper (II) complex solution spectrum recorded at (981 nm, 10193 cm^{-1}) this absorption peak due to the electronic transition ($^2Eg\rightarrow{}^2T_2g$), and this is similar with what was stated in the similar previous research works [26]. The ligand spectrum was red-shifted in complexes, proposing an octahedral geometry around metallic complexes as showed in Figure 12,13 and 14 . All data were tabulated in Table 6. shows the transition of electronic spectra for ligands 3-HMIPI , 4HOPIAB and their metallic complexes in DMSO solvent.

Table 6. The ligands 3-HMIPI , 4HOPIAB Electronic Spectra and their metallic complexes in DMSO solvent.

Compounds	λmax (nm)	ύ (cm^{-1})	Transitions	Geometry	Hybridization
$C_{20}H_{22}N_4O_2$	244	40983	π →π*	----------	----------
	294	34013	π →π*		
	426	23474	n →π*		
$[Co(C_{20}H_{22}N_4O_2)_2Cl_2]$	535	18691	$\nu_3= {}^4T_1g_{(F)} \rightarrow {}^4T_1g_{(P)}$	Octahedral	Sp^3d^2
$[Ni(C_{20}H_{22}N_4O_2)_2Cl_2]$	561	17825	$^3A_2g_{(F)}\rightarrow{}^3T_1g_{(P)} = \nu_3$	Octahedral	Sp^3d^2
$[Cu(C_{20}H_{22}N_4O_2)_2Cl_2]$	461	21691.97	$^2Eg\rightarrow{}^2T_2g$	Octahedral	Sp^3d^2
$C_{19}H_{21}N_5O_4S$	225	44444	π →π*	----------	----------
	295	33898	π →π*		
	424	23584	n →π		
$[Co(C_{19}H_{21}N_5O_4S)_2Cl_2]$	539	18,552	$^4T_1g(F) \longrightarrow {}^4T_2g(F)$	Octahedral	Sp^3d^2

$[Ni(C_{19}H_{21}N_5O_4S)_2Cl_2]$	558	17,921	$^3A_2g(F) \longrightarrow {}^3T_1g(F)$	Octahedral	Sp^3d^2
$[Cu(C_{19}H_{21}N_5O_4S)_2Cl_2]$	981	10,193	$^2B_1g \longrightarrow {}^2B_2g$	Octahedral	Sp^3d^2

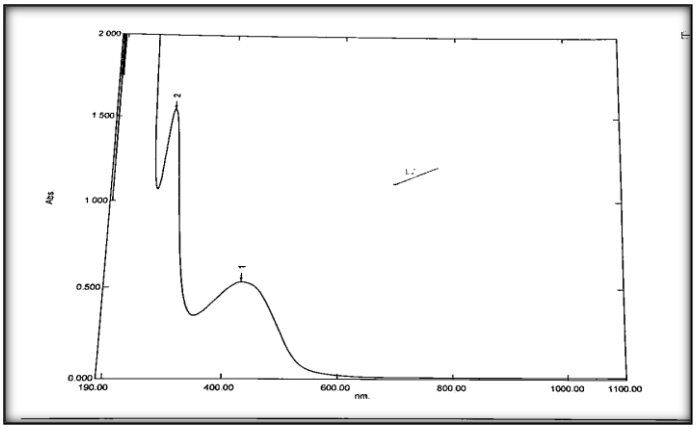


Figure 8. This is a figure of UV-Vis. spectra of the Ligand (3-HMIPI)

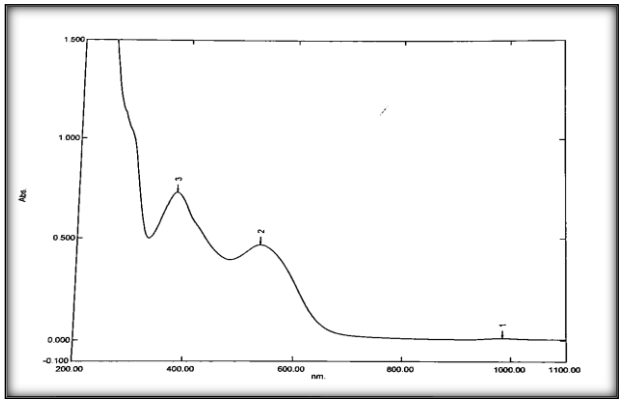


Figure 9. This is a figure of UV-Vis. spectra of Co (II) complex

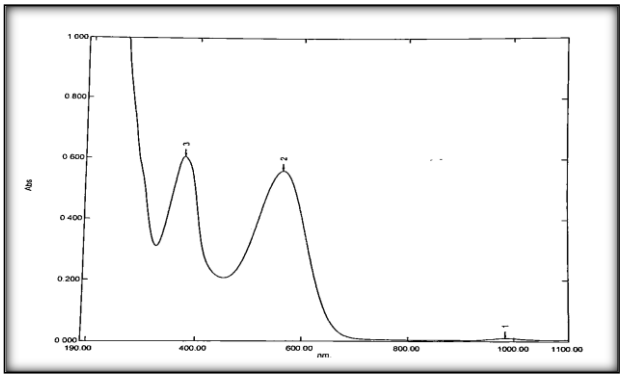


Figure 10. This is a figure of UV-Vis spectra of Ni (II) complex

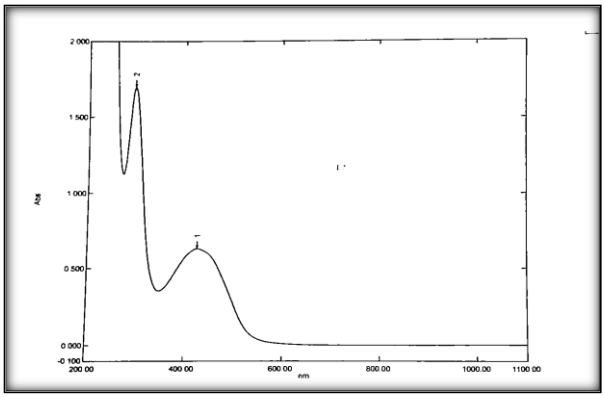


Figure 11. This is a figure of UV-Vis spectra of the ligand (4-HOPIAB)

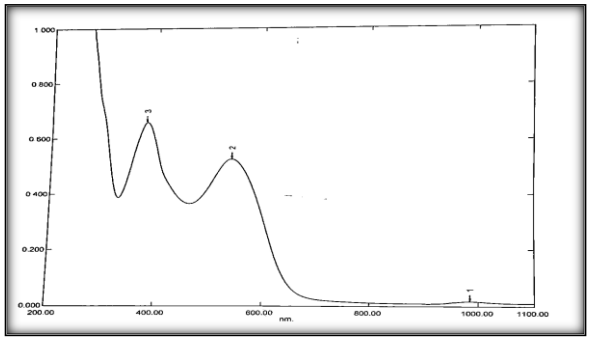


Figure 12. This is a figure of UV-Vis spectra of Co (II) complex

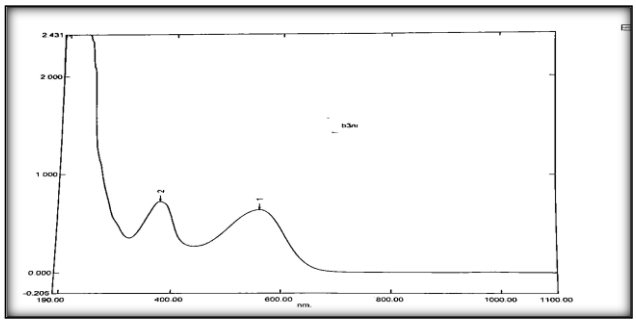


Figure 13. This is a figure of UV-Vis spectra of Ni (II) complex

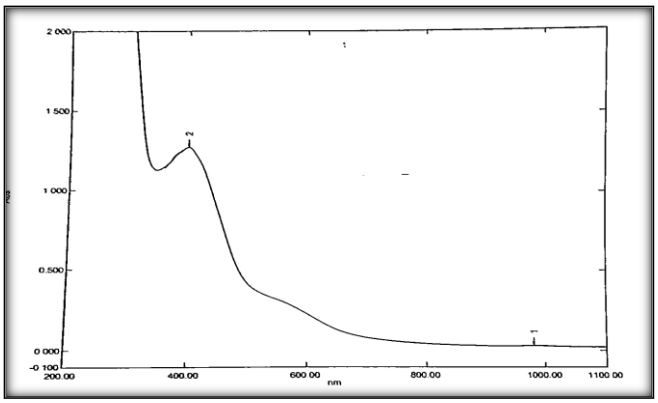


Figure 14. This is a figure of UV-Vis spectra of Cu (II) complex

3.5 Detection of chloride ions: -

In order to verify the presence of chloride ions outside the coordination sphere or not for all the coordination complexes prepared, the detection process was carried out in light of the interaction of each metal complex dissolved in an alcohol solution with an aqueous solution of silver nitrate [26,27] , which led to the absence of turbidity or the appearance of a white precipitate of Silver chloride, AgCl, in solutions, which is a clear indication of the absence of chloride ions outside the coordination ball, which supports the validity of the proposed structures of the metal complexes under study.

4. Discussion

Depending on the results of measurements and detection of the absence of chloride ion outside the coordination sphere of the chelated complexes prepared in our study and the data of infrared and ultraviolet-visible techniques, and compared with what was reported in the literature [7,12] about the sites of coordination offered in the Schiff- Mannich base ligands with the selected ions in this study.

We can conclude that two ligands 3-HMIPI and 4-HOIPAB behaved as bi-chelated ligands neutral with cobalt (II), nickel (II) and copper (II) ions to formation two five-sided metallic hetero-rings with these ligands, as the binding of the two bi-chelated ligand molecules with The metal ion provides four coordination bonds with the presence of a mono negatively charged of chloride ion to offset the positive charge of the central metal ion to form the octahedral structure.

After these resulting data it is probable to suggested the octahedral structure of all metallic complexes with these two Schiff - Mannich base ligands (3-HMIPI) and (4-HOPIAB) . The Suggested metallic complexes Structure can be demonstrated in the Figures 15. and 16 .

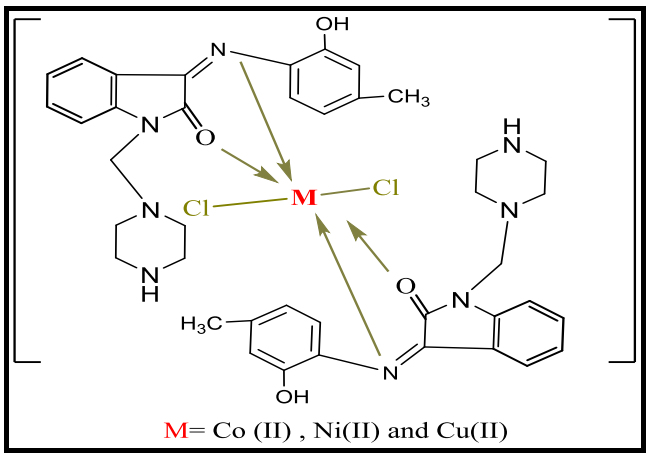


Figure15. This is a figure of Proposed Structural of the metallic complexes with ligand(3-HMIPI)

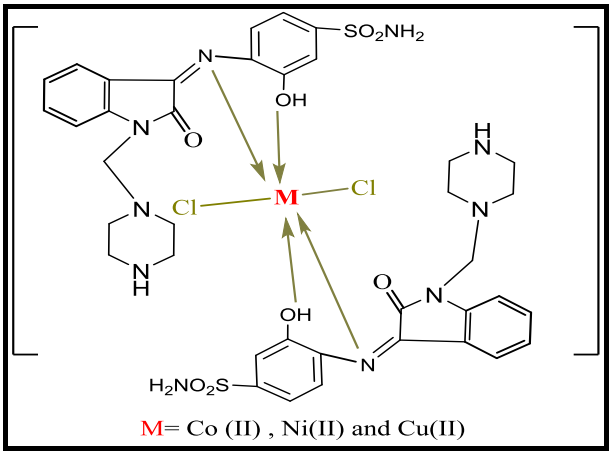


Figure16. This is a figure of Proposed Structural of the metallic complexes with ligand(4- HOPIAB)

5. Conclusions

The search results show The possibility of preparing a heterocyclic ligand as a derivative of Schiff -Mannich base, The ability of the prepared ligand to bind with the metal ions concerned with the study and The remarkable stability of each of the ligands derived from the two Schiff -Mannich base towards heat, humidity and light, through the relatively high melting temperatures of this type of compound.

Author Contributions: For research articles with several authors, a short paragraph specifying their individual contributions must be provided. The following statements should be used "Conceptualization, Ibtihal K. K. and Nadia S. M. ; methodology, Hanan F. M. ; software, Ibtihal K. K..; validation, Ibtihal K. K. , Nadia S. M. and Hanan F. M.; formal analysis, Ibtihal K. K.; investigation, Radhiyah A. A..; resources, Ibtihal K. K..; data curation, Hanan F. M.; writing—original draft preparation, Ibtihal K. K..; writing—review and editing, Ibtihal K. K.; visualization, Nadia S. M.; funding acquisition, Ibtihal K. K .All authors have read and agreed to the published version of the manuscript."

Acknowledgments: At the end of this study, we would like to thank the Deanship of the College of Education for Girls at the University of Kufa and the Presidency of the Chemistry Department for providing the opportunity to work in its laboratories, as well as the service laboratory at the College of Pharmacy / University of Kufa for conducting a set of measurements included in our research.

Conflicts of Interest: "The authors declare no conflict of interest." and "The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results".

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Biometric analysis of roots anomalies and root trunk dimensions in Iraqi populations

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Abstract: Root anomalies represent a major challenge in dentistry because they affect treatment plan

Objectives: this study was to estimate the prevalence of root anomalies in permanent molars in the Iraqi population

Material and methods: a sample of 500 extracted molar teeth from Iraqi patients had been used in this study. The included samples were 271 lower molars teeth and 170 upper molar teeth

Results: The results showed that lower molars; 265 (97.8 %) with normal roots, while 6(2.2%) are abnormal roots as, 3 (1.1 %) with dilacerations and 3 (1.1%) with short roots.

While for the upper molar teeth; 133 (74.8%) with normal roots while 37(25.2%) with abnormal roots 9 (6.1%) with 4 roots, 25 (17%) with fused root and 3 (2.1%) short roots.

The highest root length for the lower molar was in the 10 mm and 12 mm group which was 35 (20.6%) , while for the upper molars was in the 15 mm group which is was 82(30.26%).

While for cervical third length; the lower molar showed the highest frequency in 5 mm group 62(22.8%) while for the upper molars was 65(38.2%) in the 3mm group.

The highest width of the cervical area was 181(66.79 %) in the 8mm group for the lower molars; while for the upper molar was 76 (44%) in the 7 mm group.

Conclusions: The prevalence of molar root anomalies in the Iraqi population is very rare and the most common anomaly was dilacerations in lower molars while in upper molars was fused buccal plate.

Keywords: Anomaly, Dilaceration, Short root

Introduction: Dental anomalies represented one of the major clinical problems during the management of cases in the dental clinic.

Their frequency will vary among the population and the given data were used for the phylogenic and genetic studies and aid in appreciative the differences within and between the different populations(1)

The anomalies affect both the crown and the roots of the teeth and could occur due to either local or systemic factors that cause developmental disturbances(2) that may cause different clinical problems such as delay eruption, attrition, esthetics, occlusion problems in addition to difficulties in restorative, endodontic orthodontic and surgical treatment (1,3)

Root anomalies could be occurred either alone as a defect to the radicular part of the tooth or as a part of general tooth dysplasia (4)

Hertwig's epithelial root sheath is the embryonic part of tooth germ that govern the shape, number, and length the root, stimulates the formation of root dentin, and contribute to the formation of root cementum(5)

Disorders of root formation could be:

Early stoppage of root formation due to an extrinsic factor-like short root anomaly root, malformation related to a cervical mineralized diaphragm, taurdontism, molar incisor malformation, dilacerations, extra root formation, double root formation, concrescence (4,5)

Molar teeth showed variations in the number of roots and root canals and they may be divided according to the site of their occurrences into:

1-Third root (radix entomologist)(RE) an extra-root locates distolingually in mandibular molars mostly the first molars. When occurring in the mesiobuccal side; it's called radix paramolaries which is very rare and less frequently than RE (6)

2-Short root anomaly (SRA): is a short root with rounded apices and a small crown to root ratio. This could be bilaterally (7)

These anomalies showed variations between populations such as Caucasians, Mongolians, Hispanic and may have an autosomal dominant pattern of inheritance (8)

3-Root dilacerations: this is characterized by an abnormal root angulation which leads to difficulties during eruption and complications in the orthodontic and endodontic treatment or extraction. This abnormal angulation or bend in the root is due mostly to idiopathic causes without clinical feature but mechanical trauma could be the most accepted cause (9, 10)

4- Four rooted molars:

The presence of maxillary molars with 4 roots (2 buccal and 2 palatal) is enormously infrequent even with maxillary molars with 4 root canals. (11)

5-Dimensional variations in the root:

That is meaning there aren't any slandered measurements for the teeth whether for crown or root due to many variations that occurred during tooth development. These variations make many treatment plans are difficult to be obtained unless we refer to x-ray. But even by using an x-ray, these measurements are needed to be expected prior to starting the treatment. Endodontics is affected more by the determination of the exact working length and the opening of root canal orifices which may lead to perforation if not opened in a correct depth that is required the determination of trunk length that extends from cement-enamel junction to the furcation area in multi-rooted teeth.(30)

Material and methods:

The study had been done on a sample of extracted teeth collected from Iraqi patients from different age groups. The teeth from many dental clinics in Baghdad, Iraq by ordinary extraction. The samples consisted of 500 molar teeth and the teeth which had complete root structures and fully developed apices were included while teeth with fractured roots or incomplete roots were excluded. The third molar was not included in this study because of different abnormalities associated with its development.

The final number was 271lower molars (first and second molars) teeth and 170 upper molar teeth (first and second molars).

The teeth were well cleaned by removing debris of soft tissue and soaked in a sodium hypochlorite solution. Each sample was examined for the number and shape of the roots. The distance from cement-enamel junction to the furcation area was measured, root length and width of cervical area at mesiodistal dimension from the buccal side.

Results: the results showed that lower molars; 265 (97.8 %) with normal roots number and shape, while 6(2.2%) are abnormal roots as, 3 (1.1 %) with dilacerations and 3 (1.1%) with short roots.

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The highest width of the cervical area was 181(66.79 %) in the 8mm group for the lower molars; while for the upper molar was 76 (44%) in the 7 mm group.

Discussion:

Tooth anomalies are defects of development that are caused by environmental factors, genetic disorders, or local factors during tooth formation. Molar roots anomalies as epidemic reports or studies within communities or families have rarely been studied in Iraq. In this study, 2.2% of the total study lower molar group had root anomaly. While 25.2% of upper molars had root anomalies. This represented significant differences between this study and other epidemiological studies. That can be explained mainly by racial differences and specimen collection methods. Also variations between population groups as well as gender differences, and body size. that could be explained to the interaction of genetic, local, and environmental factors that interaction may have a direct or indirect influence on the development of the dentition (12)

Short-root anomaly: the prevalence of short root in this study was found to be 1.1% in lower molars and 2.1% in upper molars. This condition is found frequently in permanent maxillary incisors where the crown-to-root ratio of more than 1:1. while there is also an idiopathic generalized short-root anomaly which is very rare (13)

The prevalence of (SRA) in another study was1.3% occurring mostly in maxillary incisors, maxillary premolars, lateral incisors, and lower second premolars (14, 15) and 0.1% in another study performed by the evaluation of dental anomalies on panoramic radiographs (16)(SRA) seem to be more frequently in Latino individuals and have a tendency for anterior teeth (17)

Dilacerations:

It's an eccentricity or curve in the linear relationship of a crown of a root. It has rare occurrences especially for molars without obvious clinical features. Dilacerations can happen in both deciduous and permanent teeth but the incidence rate is greater in posterior teeth and in the maxilla and could be occurred due to trauma and developmental disorders and may be linked with some developmental syndromes. additional probable contributing factors could be scar formation, facial clefting advanced root canal infections., ectopic development of the tooth germ, lack of space and area, the effect of anatomic formations e.g. cortical bone of the maxillary sinus, mandibular canal, or nasal fossa which might preserve the epithelial diaphragm), presence of an adjacent cyst, tumor or odontogenic hematoma, mechanical interposition with eruption,tooth transplantation extraction of primary teeth and heredity and genetic factors(18)

Dilacerations of molar roots are more frequent in the third molar while in first and second molar could be a less and clinical diagnosis of dilacerations is necessary because in permanent molar made a challenge in orthodontic and endodontic treatment.

In the present study;1.1% of lower molars only had dilacerated roots while in upper molars no dilacerated root had been shown compared to another study; 3.78% were recorded in the examined teeth as mandibular third molar was the most frequently affected (19.2%) followed by mandibular first molars (5.6%).

While the maxillary and mandibular incisors were least affected showing dilacerations in about 1% of teeth. (19)

In other research; the prevalence of root dilacerations were in mandibular third molars as (24.1%), maxillary first molars as (15.3%), second molars as (11.4%), and third molars as (8.1%). Dilaceration was less common in the mandible than in the maxilla (20) while (16.0%) of people had one or more teeth that were dilacerated and these were as (15.2%) males and (16.6%) females. Dilaceration also was found in mandibular third molars most often (3.76%), then mandibular second molars (1.81%), 1.23% of maxillary second premolars, and 1.23% of mandibular second molars (21)

Another study showed that dilacerations of the root was found in 0.3% of teeth which spread equally between the maxilla and mandible. The mandibular second molar was the most frequent dilacerated tooth (1.6%), maxillary first molar (1.3%), and mandibular first molar (0.6%) (22)

Four rooted maxillary molars:

It's a condition of the presence of four separate roots as two palatal and four separate canals. A study done on some populations showed 1.4% had two palatal roots (23) while other study failed to find any four rooted maxillary molars between 268 maxillary molars in a Thai population (24)

Another study was done to find the frequency of four-rooted with two palatal roots maxillary second molars in which 1000 untreated teeth were evaluated radiographically. 200 teeth were radiographically examined after the endodontic treatment. The results indicated that only 0.4% of the teeth presented with four separate roots (25) which is much less than the incidence in our population which was 6.1%

Fused roots:

Molar root fusion was evaluated by direct observing and measuring the length of the root. In our study, the prevalence was 17% compared to other studies which were 29% of all molars, had fused roots which were found more frequently in maxillary than mandibular molars (26)

While other studies showed that the root fusions commonly affected upper and lower 2nd molars (39.7% and 28.1%, respectively and most of the root fusions affected the maxillary 2nd molars in the Chines population (65.7%) (27) and in Colombian, the first maxillary molar was 43% while the second molar 57%(29).

Other researches showed that the majority of root fusion was in molars than had been normal as 29% had fused roots . The number of molars with fused roots was in average of 2.3 per patient, in compares to 5.6 molars with non-fused roots per patient, a ratio of approximately 1 (fused):2.4(nonfused) with 35% of all maxillary molars showing root fusion, compared to 24% of mandibular molars (28)

Root fusion was most public in third molars, followed by second molars, in both jaws with a tendency of symmetry. The prevalence of molars with root fusion was approximately 5% in females more than in males, and about 13% greater in the females molar root fusion than males (26)

There were very few studies about the measurements of the root and root trunk; it was for the lower second molar only (30). In this research, there was the registration of data for both first and second molars in the upper and lower jaws using an ordinary calibration device. These included the width of the cervical area at CEJ and the distance extended between the CEJ to the furcation area. The importance of these findings in the Iraqi population could be used for giving an idea during rapid decision that needed in emergency cases or even in case we need to reduce the risk and need for x-ray

In a comparison of the root length for maxillary molars(first and second) in another study (31) which found that the average root length was between 9.44-10.89mm; this study found that the most common root length was 15 mm; while for the lower molars, we could not find any study to be compared with. The benefit of the knowledge of the prevalence of root length in certain populations may be used in emergency treatment especially in tooth extraction and even endodontic treatment.

Conclusion:

Root molar anomalies of first and second molars for both jaws in Iraq seem to be related to short root anomalies, dilaceration, four rooted teeth, and fused roots.

The most common one was dilaceration for the lower jaw and four rooted in the upper jaw.

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Tooth	0-fused	2 mm	3 mm	4 mm	5 mm	6 mm	7 mm	8 mm	total
Upper	6(3.5 %)	4(2.4%)	65(38.2%)	55(32.35 %)	31(18.2 %)	6(3.5%)	2(1.2%)	1(.59 %)	170
lower	-	7(2.6%)	130(48 %)	59(21.8%)	62(22.8 %)	7(2.6%)	3(1.1%)	3(1.1 %)	271

Table (1): Frequency and percentage of the root length

Table (2): cervical third length frequencies and percentage in the upper and lower molars

Tooth	9mm	10mm	11mm	12mm	13mm	14mm	15mm	16mm	17mm	18mm	19mm	total
Lower molars	9	35	23	35	28	25	11	1	2	1	0	170
	5.29%	20.6%	13.5%	20.6%	16.4%	14.7%	6.5%	.59%	1.18%	.59%	0	100%
Upper molars	2	7	14	55	31	50	82	22	4	3	1	271
	.74%	2.58%	5.17%	20.29%	11.99%	18.5%	30.26%	8.19%	1.48%	1.11%	.37%	100%

Table(3): Frequency and percentage of cervical root width

Tooth	**5**	**6**	**7**	**8**	**9**	**10**	**total**
Upper molar	1	17	76	68	5	2	171
	59%	1%	44%	4%	5.88%	1.18	100%
Lower molar	0	0	13	181	52	23	271
			4.8%	66.79%	19.19%	8.49%	100%

Estimation of heavy metal levels in serum and urine of athletes and non-athletes in Kamalia, east of Baghdad

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Abstract

This study focused on evaluating the practical effect of a 3-month period (from 12/20/2022 to 3/21/2023) of aerobic physical education on determining toxic heavy metal concentrations in blood and urine for ages (15 to 46 years), 55 athletes were identified, 30 of them (15-25) and 25 (26-46). year

And 57 non-athletes, 28 (15-25) and 29 (26-46) years old, all in four groups, which are arsenic (As), cadmium (Cd), and lead (Pb) in the Kamaliya area, which is full of environmental pollution as a result of the presence of small laboratories. Blood and urine samples were collected with great care and prepared using known scientific methods. Determination of heavy metal concentrations in an inductively coupled plasma atomic emission spectrometer (ICP-AES) in the Medical City Hospital laboratories. This experiment confirmed that levels of trace metals in blood samples of non-athletes are significantly higher than those of athletes. The concentrations of these metals were high. All groups had a probability of $p<0.05$ in blood and $p<0.5$ in urine.

This is possible due to the possible accumulation of minerals in the human body, that the minerals in the urine samples that are excreted through these collections are much less compared to the presence of these minerals in the blood samples. Arsenic, lead, and cadmium have been detected in blood and urine from urine and blood samples of athletes and non-athletes. It was noted that the percentage of minerals in blood samples was higher in the urine of athletes than in non-athletes. Concentrations of these minerals in the urine decreased significantly among athletes at the age of (15-25) years. These minerals in the urine decreased significantly among athletes at the age of (15-25) years.

Keywords: Heavy metals; Arsenic; Cadmium; Blood; Urine; athletic.

introduction

The human body is exposed daily to arsenic, lead, and cadmium toxins. and other materials. Available heavy metal pollutants provide first-rate importance to the study of all lifestyles in the ambiance due to their poisonous verdict.” during

the last century, those toxic metals and different commercial pollution were determined in water and food assets, or maybe in our houses. when ingesting these toxic metals gather in the cells and tissues of the bodywhich ، can lead to many health problems. [1,2]

Every person on the planet has heavy metals in their structure to some extent. There is no way to completely eliminate heavy metals. But we can try to reduce pollution and its excess secretions by eating a healthy diet and good lifestyle alternatives.

Since the last century, it has been shown that most cases of cancer are increasing in the United States of America, Russia, Japan, and China. most cancers It is now the main cause of death in all countries and there's proof that heavy metal publicity plays a function threat of most cancers, as does arsenic and its function in the bladder in most cancers. Rapid exposure to heavy metals is also an evolving problem in Africa. [2,3]

At the beginning of the 20th century, 3% of the US population suffered from cancer. Cancer increased in the American population in the 1950s by 20%. In 2000, 38% percent had advanced cancer. Doctors expect that with the help of advanced equipment, a person with life-threatening cancer will be identified sooner or later.[5]

Although many industrial governments are working to reduce the publicity of heavy metals through stringent environmental requirements and pollutant reduction policies, we must do everything we can to no longer simply avoid exposure to heavy metals but to promote well-developed cleansing mechanisms and the use of medicinal herbs in our region and Which has the ability to remove toxins and heavy metal pollutants and get rid of bad health consequences. [4,5]

Heavy metal toxicity and its impact on human health

1- Metabolism is important in the body of an organism and maintaining it requires a level of heavy metals in constant amounts such as iron, cobalt, copper, manganese, molybdenum, zinc, and selenium.

2- The basic heavy elements are important for the work of enzymes that perform as common ions (important for cell metabolism at low concentrations) such as Zn^{++} and Mg^{++}, while the non-essential heavy elements are toxic to the cell and collapse their components at low concentrations and include cadmium, lead, and arsenic. [6,7]

3- Eating huge quantities of marine organisms consisting of fish and crustaceans, where their bodies contain high concentrations of heavy metals, leads to the transmission of pollutants to humans, which can be called metal poisoning), where the ability of heavy metals to accumulate and its danger inside the body so it can be excreted through metabolism or excretion.[8]

Minerals polluting water and food cause danger in the body of animals:

1- Cadmium: as a result of consuming foods or drinks contaminated with large concentrations of cadmium at an amount of 16 mg/liter or / kg. After several years, large quantities accumulate in the body, and symptoms of cadmium poisoning appear, for example, nausea, vomiting, and abdominal pain.

Cadmium has a direct effect on the contraction of blood vessels, its effect on high blood pressure, and its carcinogenic effects on the lung and prostate.[9]

2- Lead: Lead is found in high proportions in water and aquatic organisms, and in industrial and human pollutants. Battery factories are among the most important industrial pollutants, and pipes are used to transport drinking water and dump some industrial waste into rivers. The nervous system, renal excretory system, and circulatory system are greatly affected by these pollutants, including the biochemical activities of the contaminated organisms. Poisoning includes anemia, emaciation, loss of appetite, and blue discoloration of the gums when the blood lead level reaches 0.6-8.0 ppm.[10]

3- Arsenic: It is used to manufacture agricultural pesticides and the preservation of wood depends on arsenic and its organic compounds. Once arsenic cannot be broken down when released into the external environment, most of its compounds are soluble in spring water. Long-term exposure to arsenic causes cancer of the bladder, lungs, skin, liver, nasal passages, liver, and prostate.

Low levels lead to nausea, vomiting, increased production of red and white blood cells, irregular heartbeat, and blood vessel destruction. [11]

Materials and methods

Study design: -

This study focused on evaluating the practical effect of a 3-month period (from 12/20/2022 to 3/21/2023) of aerobic physical education on determining toxic heavy metal concentrations in blood and urine for ages (15 to 46 years), 55 athletes were identified, 30 of them (15-25) and 25 (26-46). year

Blood and urine samples were collected in the district health center laboratory. According to the standard collection methods used, The samples were kept in a polyethylene container, where they were washed with distilled water of 20% nitric acid, then rinsed with deionized water and dried in an oven to remove metal contaminant residues. [12,13]

Determination of heavy metals in blood samples

Blood samples were drawn from all the subjects under study in ordinary bottles and left for ten minutes to coagulate, and the coagulated samples were placed at 2000 revolutions per minute to get blood serum within ten minutes.

Before the analysis, the serum was kept at 20 ° C in plastic vials, and each milliliter was diluted to 10 with deionized water. [13,14]

Evaluation of urine samples for the determination of heavy metals

One hundred twenty-five (125 cm3) of each urine sample were evaporated in a water bath to 25 cm3. The samples were then frozen, dried, and stored in a refrigerator.

The freeze-dried urine sample was left at room temperature and then re-dissolved using 20 cc of water.

Using concentrated nitric acid, 5 ml of the solution was acidified and evaporated in a water bath to a depth of 10 cm

Equal amounts of concentrated HNO3 and HClO4 were transferred to the smoke chamber. The solution is heated on a hot plate; Heating is stopped after thick white smoke appears and a clear solution appears.

After cooling the solution, water is added for up to ten minutes to purify nitrogen oxide from chloride. Whatman 540 acidified filter paper was used and placed in a 100 cubic centimeter beaker and filled with distilled water to the mark.[15]

Assay of specimens for different age groups

The ages are categorized as follows: (15-25 and 26-40), and each age group includes athletes and non-athletes.

Blood samples were placed in 5 mL plastic vials Then urine samples were collected in sterile Sandoz vials. From the results mentioned above, the concentrations of all minerals in urine samples were lower than those found in blood samples, due to the possibility of accumulation and concentration of minerals in the human body. The amounts of water drunk by these populations may be responsible for the presence of these minerals in blood and urine samples.

Discuss the results

By reading Figures No. 1, No. 2, No.3, and No. 4, we noticed a clear difference between the level of arsenic between the athletic and non-athletic groups in the level of arsenic, especially in the blood serum, as well as the age groups, where the older the human age, the higher the levels of arsenic in the urine and blood serum, this applies to the remaining two elements, cadmium، and lead, due to the toxic accumulation in the body of all heavy substances. items over many years. While the accumulated levels decrease due to frequent urination and the expulsion of toxins by withdrawing and filtering them through the kidneys and expelling them from the bladder with the amount of urine outside.

Figure 4 shows the toxicity of heavy metals increased with age for all the athletic and non-athletic groups

The statistics showed that the level of heavy metals in the blood for the realistic probability of the sports age groups was $p<0.05$ in the blood serum and urine due to the effectiveness of the blood circulation to expel toxins through the kidneys.,

while the probability reading was p<0.5 for the level of heavy metals in the blood and urine for non-athletes due to lack of activity The body and slow excretion of toxins from the body.

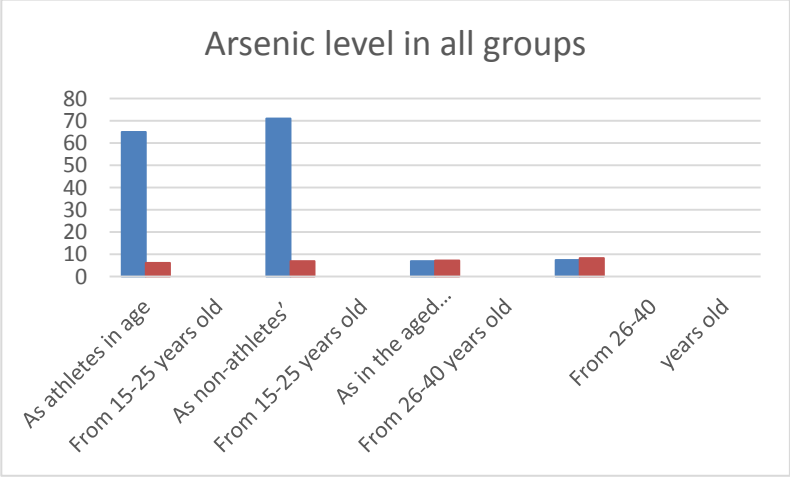

Figure (1) Variation of Arsenic levels in blood and urine

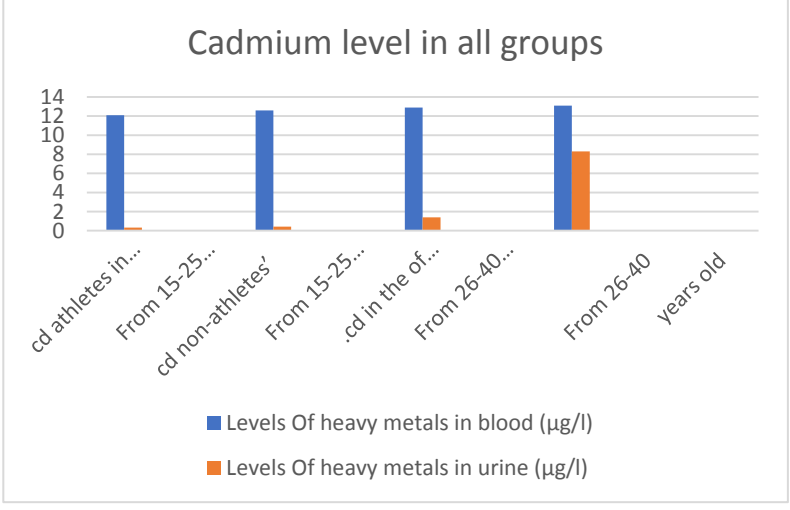

Figure (2) Variation of Cadmium levels in blood and urine

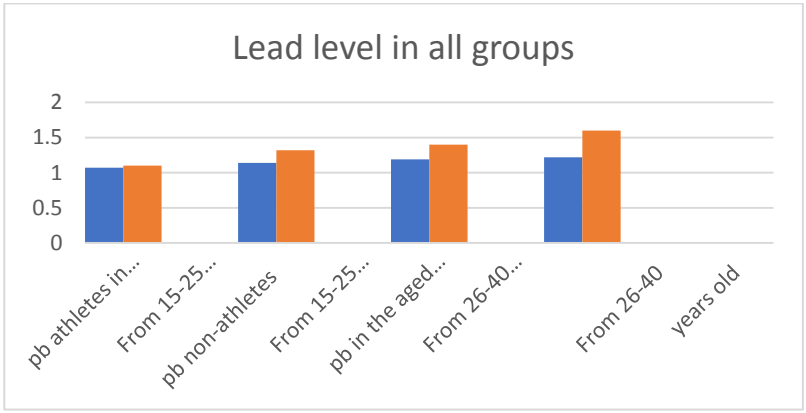

Figure (3) Variation of Pb levels in blood and urine

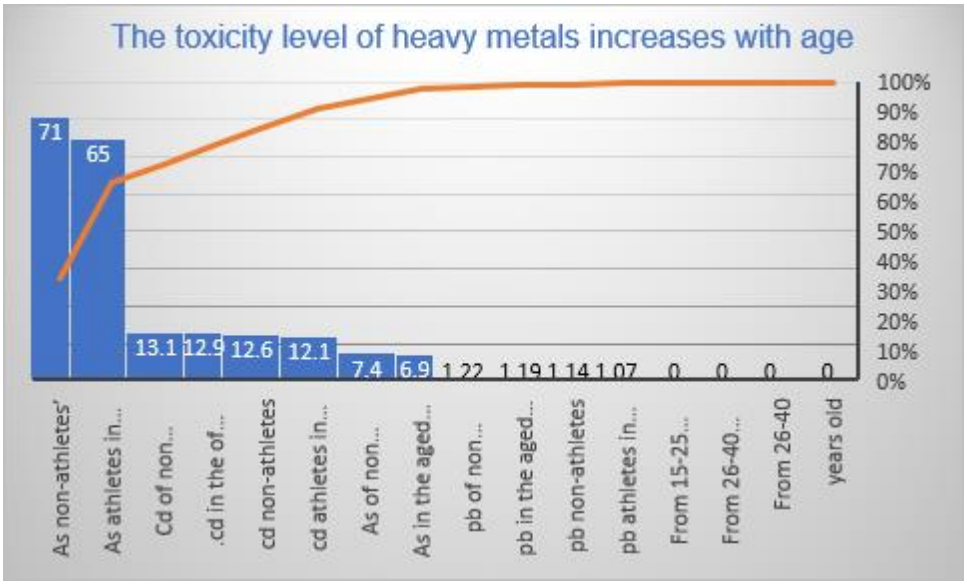

Figure (4) Heavy metal toxicity increased with age for all groups

Conclusion

The metal concentrations of blood and urine samples were in all cases below standard values. The concentrations of all minerals in the urine samples were lower than those in the blood samples due to the accumulation and concentration of minerals in the human body.

Concentrations of all minerals with respect to age were higher in the urine as compared to the blood samples.

Concentrations of all minerals in blood and urine samples increased with increasing age groups, indicating that the accumulation of minerals depends on age.

Recommendations

It was clear the effect of pollution in the semi-industrial area, which deals with the large section of the workers in the polluting materials recycling plant, led to a high percentage of minerals in their bodies, especially those who do not practice sports and physical training, which requires attention to this aspect of physical practice to reduce metal pollution, as well as increase thehealth awareness of citizens through different media.

Improving a healthy diet

Fasting is the most effective and cost-effective way to expel toxins from the body. Abstaining from food and drink for a certain period of time helps the body to remove harmful toxins from the body.

Maintaining the health of the gastrointestinal tract

The intestine is the primary route through which toxins enter the body. Many suffer from bowel problems, such as irritable bowel syndrome, chronic diarrhea, constipation, bloating, etc. They often have a condition called leaky gut syndrome, which leads to difficulty in absorption. A weakened intestinal barrier leads to increased absorption of heavy metal chemical toxins. For the purpose of maintaining gut health, probiotics and prebiotics are used. Avoiding common foods such as wheat, dairy, and corn may be beneficial for some.

Avoiding some products such as dairy products and wheat is good for the body. It is advisable to consume sufficient amounts of fruits and vegetables for their many benefits.

liver activity

The liver's job is to remove heavy metals and other toxins from the blood. The liver performs many chemical reactions to remove toxins from the blood. Certain nutrients are very important for this process to occur. Limit or avoid alcohol consumption when trying to detox.

There are diet tips for detoxification

• Maintain hydration by drinking fluids, especially water. This will help flush out toxins from the body

• Reduce the intake of sugar, sweetened drinks, and carbohydrates and replace them with fresh or dried fruits

• Regular aerobic exercise and strength training to maintain a healthy body and improve blood circulation.

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Antibiotic susceptibility profile related to *Proteus mirabilis*

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Abstract: Proteus mirabilis is gram-negative bacteria that considered responsible for urinary tract infections [UTI], especially catheter-associated urinary tract infections. The samples of urine [119] were collected from Baghdad hospitals. Proteus spp was recognized by morphology, the Vitek-2 compact system and PCR. Antibiotic susceptibility test was also done using the vitek-2 system. The Results were shown out of 35 isolates belong to P. mirabilis, they were appeared highest resistance against minocycline, ticarcillin, trimethoprim/sulfamethoxazole, and ticarcillin/ clavulanic with 71.40 %, 68.57%, 65.70% and 57.10% respectively; while, they were sensitive to meropenem and piperacillin/ tazobactam with 2.85 %and 5.57% respectively. Seven isolates classified as XDR, concluded that the most effective antibiotic against P. mirabilis was meropenem while the least effective antibiotic was minocycline.

Keywords: *Prot*eus *mirabils*; Antibiotic Resistance; PCR; Meropenem

1. Introduction

Proteus mirabilis is a Gram-negative, facultative anaerobe rod-shaped bacterium most noted for its swarming motility in specific bulls'-eye pattern and urease activity [1]. *P. mirabilis* is a member of the micro flora that lives in the human intestine [2]. In most situations, P. mirabilis does not cause any harm; but, when it interacts with urea in the urinary system, it can lead to infections. After that, the infection could spread to other parts of the body [3]. Symptomatic infections of the urinary tract can be caused by P. mirabilis [4, 5], such as cystitis and pyelonephritis. However, asymptomatic bacteriuria is common, particularly in the elderly and in people with type 2 diabetes. Patients who suffer from these illnesses are at an increased risk of developing urosepsis, which is caused by bacteremia and has the potential to be fatal. In addition, a P. mirabilis infection may result in urolithiasis, which is the production of stones in the urinary tract [6]. In addition to causing urinary tract infections, this species has also been associated to cases of baby meningoencephalitis, empyema, and osteomyelitis [7, 8]. It is also capable of causing infections in the eye, ear, nose, throat, burns, and other wounds in addition to the respiratory tract. Urease, motility and adhesion mediated by flagella and fimbria, toxins including hemolysin and

Proteus toxic agglutinin [Pta], Lipopolysaccharide [LPS], metal acquisition, and biofilm formation are only a few of the virulence factors that *P. mirabilis* possesses that cause urinary tract infections (UTIs) [9]. Research has demonstrated that pathogenic P. mirabilis is resistant to the antibiotics benzylpenicillin, oxacillin, tetracycline, and macrolides [10]. By carrying out this experiment, the aim of this study to determine which antibiotic is superior in its ability to combat *P. mirabilis.*

2. Materials and Methods

Isolation and identification

Between October 2021 and February 2022, a total of 119 samples of urine were taken from patients at various hospitals located in Baghdad, Iraq, and stored in sterile containers. Baghdad Teaching Hospital, Ghazi Al-Hariri Hospital for Surgical Specialties, and the Teaching Laboratories at Medical City in Baghdad were some of the establishments that were listed in this category. At a temperature of 37 37^{o}C, the samples were grown for twenty-four hours on MacConkey agar [Himedia/India]. The isolates were categorized according to the morphological traits that they possessed. Blood and MacConkey agar were the preferred growth media throughout the process of cultivating and identifying the various isolates.

Also, The Vitek -2 system was used for identification of *P. mirabilis*. The specimens were grown on nutrient agar and then Gram negative identification GN Kit was used with Vitek-2 compact device to identify the specimens as P. mirabilis or not. Molecular identification using Polymerase chain reaction [PCR] with specific *P. mirabilis* 16SrRNA primer [16SrRNA-F: 5_AGAGTTTGATCCTGGCTCAG_3], 16SrRNA-R:[5_CTACGGCTACCTTGTTACGA_3][11] was conducted for further identification.

Antibiotic susceptibility test using vitek-2

In this method the test was conducted using the vitek-2 system to detect the multidrug resistance [MDR],for 16 different antibiotics included :[amikacin, aztreonam, cefalexin, cefazidime, cefepime, ciprofloxacin, gentamicin,

imipenem, meropenem, minocycline, tazobactam, ticarcillin, ticarcillin/ clavulanic acid, tobramycin, trimethoprim, piperacillin].

3. Results

Out of 119 samples that were collected from urine were cultivated the results shown that 35 isolates were P. mirabilis, the isolates had given pale colonies and swarming movement[bull's-eye pattern] on both blood and MacConkey agar [figure 1]. Also, vitek-2 device was done on the35 isolates and all of them gave positive result just as shown in [figure 2]. Further identification using PCR, the positive results appeared on clear bands with size 1500bp for the 16sr RNA gene [figure 3].

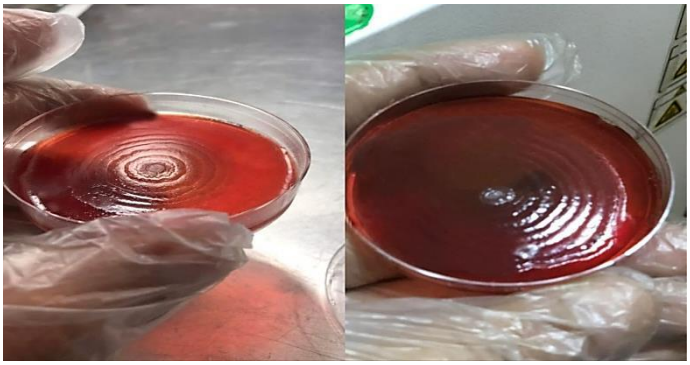

Figure 1: Swarming motility [bull's-eye pattern] of P. mirabilis

bioMérieux Customer: Microbiology Chart Report Printed November 8, 2021 12:56:17 AM CST

Patient Name: 40, . Patient ID: ERHDF
Location: Physician:
Lab ID: 160 Isolate Number: 1

Organism Quantity:
Selected Organism : Proteus mirabilis

Source: **Collected:**

Comments:	

Identification Information	**Analysis Time:**	4.93 hours	**Status:**	Final
Selected Organism	91% Probability	**Proteus mirabilis**		
	Bionumber:	0417100341462231		
ID Analysis Messages				

Biochemical Details

2	APPA	-	3	ADO	-	4	PyrA	-	5	lARL	-	7	dCEL	-	9	BGAL	+
10	H2S	+	11	BNAG	-	12	AGLTp	-	13	dGLU	+	14	GGT	+	15	OFF	+
17	BGLU	(+)	18	dMAL	-	19	dMAN	-	20	dMNE	-	21	BXYL	-	22	BAlap	-
23	ProA	-	26	LIP	-	27	PLE	-	29	TyrA	+	31	URE	+	32	dSOR	-
33	SAC	-	34	dTAG	-	35	dTRE	+	36	CIT	+	37	MNT	-	39	5KG	-
40	lLATk	-	41	AGLU	-	42	SUCT	+	43	NAGA	-	44	AGAL	+	45	PHOS	+
46	GlyA	-	47	ODC	+	48	LDC	-	53	lHISa	-	56	CMT	+	57	BGUR	-
58	O129R	+	59	GGAA	+	61	lMLTa	-	62	ELLM	+	64	lLATa	-			

Figure 2: *P. Mirabilis* identification using Vitek-2 compact system

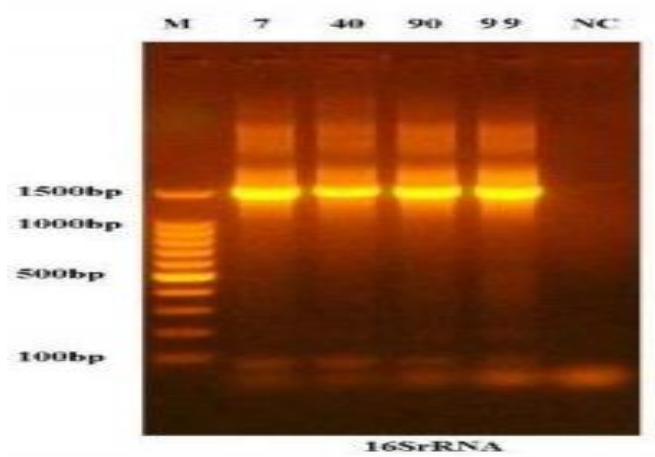

Figure 3: Electrophoresis of a 1.5% agarose gel stained with Eth.Br.M: 1500bp ladder marker reveals the results of 16srRNA gene amplification in *P. mirabilis* samples.

Antibiotic susceptibility test

The susceptibility of 35 isolates of P. mirabilis against 16 antibiotics were tested using the Vitek-2 compact system, the results were obsereved resistance up to [71.40%] to minocycline, followed by[68.57%] ticarcillin, [65.70%] trimethoprim/sulfamethoxazole,[57.10%] ticarcillin/clavulanic acid, and [54.28%] gentamicin respectively. Only seven of the entire isolates [20%]considred extensively-drug resistance [XDR] bacterial isolates. The meropenem was recorded highest sensitivity with [2.85%], followed by [5.70%] amikacin, [8.57%] piperacillin/ tazobactam, [27.10%] impenem, [31.40%] ciprofloxacin, and [34.20%] piperacillin respectively [shown in figure 4].

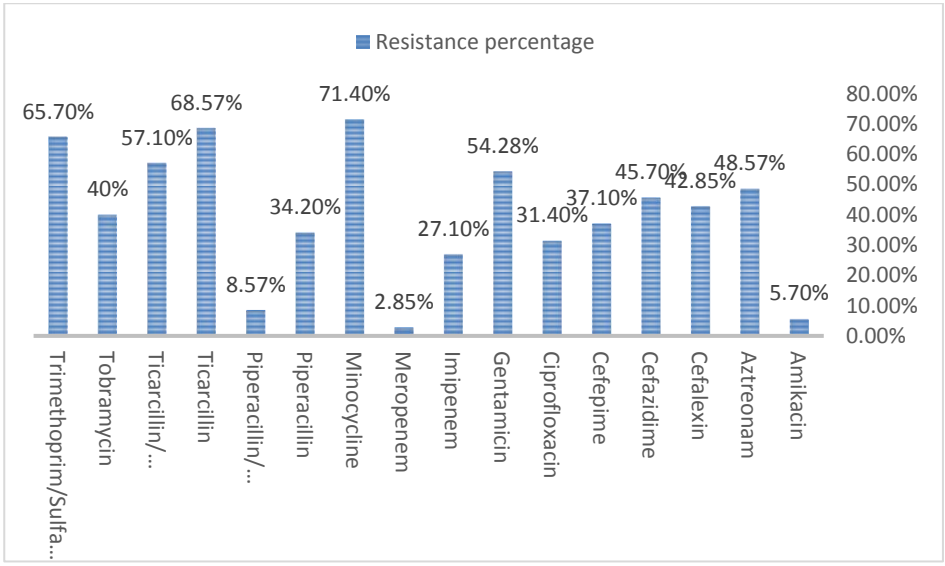

Figure 4: Antibiotics resistance percentage for *P. mirabilis* isolates

4. Discussion

The leading results showed a higher incidence of *P. mirabilis* [29.4%] compared to Treska Dh. Kamil and Sanaria F. Jarjes that showed incidence of [26%] of all samples identified as Proteus [90% of these Proteus samples identified as Proteus mirabilis] [12]. Also, higher in about twice of the incidence

that reported by Dalia A. Ahmed who stated that [19.7%] of all collected samples identified as Proteus [66.6% samples were identified as Proteus mirabilis] [13]. Proteus of This increase in Proteus spp isolates is attributed to hygiene, lack of contamination, increase of antibiotic resistance and the emerging of extended-spectrum beta-lactamases [ESBLs] Proteus mirabilis that has the ability to confer resistance to next generation through horizontal gene transfer [HGT], thus causing serious health problems. The highest resistance percentage was for minocycline [71.4%] 25 isolates were resistant to minocycline. Minocycline is a semisynthetic antibiotic that is produced from tetracyclines. It is given via systemic administration and is used to treat a wide variety of infections caused by both Gram-negative and Gram-positive bacteria. Minocycline, like other tetracycline antibiotics, limits the production of bacterial proteins by binding to the 30S ribosomal subunit and blocking the ligation of the aminoacyl-tRNA [14]. This is done in the same manner as other tetracycline antibiotics. Because of this quality, minocycline is mostly considered to be bacteriostatic. According to the findings of Serry FM et al. [15], all of their tetracycline-resistant isolates were able to fulfill these requirements. The percentage of individuals who were resistant to gentamicin was [54.28%]. There were a total of 19 isolates that were resistant to the antibiotic gentamicin.This conclusion is in line with the findings of Essam F.A. Al-Jumaily and Sara Hussein Zgaer[16], which are compatible with the fact that Gentamycin is a member of the class of medicines known as aminoglycosides. Aminoglycosides are powerful broad-spectrum antimicrobials that impede protein synthesis in prokaryotes. As a member of the carbapenem family, impenem kills bacteria by entering their cell wall, interacting with penicillin-binding proteins, and inducing the deactivation of intracellular autolytic inhibitor enzymes, these findings also demonstrate that 27.1% of bacteria are resistant to impenem [17]. This disagree with results by Essam F.A. Al-Jumaily* and Sara Hussein Zgaer results that shown that Imipenem was the most effective drug against P.mirabilis isolates [97.2%] [16]. The lowest resistance percentage [2.85%] was for meropenem which also belong to the class carbapenem with only 1 isolate was resistant to meropenem. This agree with results by Serry FM et al that showed lowest rate of resistance was also for meropenem [6.4%] [15].

5. Conclusions

Meropenem is the most effective and the best choice to be used to treat *P. mirabilis* infection where it only 1 out of 35 isolates showed resistance toward meropenem while the second best antibiotic to use is amikacin.

Acknowledgments: We acknowledge all persons who support us to complete this work.

Conflicts of Interest: Authors declare there is No any conflicts.

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Comparative study of Antibacterial activity of AgNPs and antibiotics

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Abstract: twenty two sample of urine had been scanned for Urinary Tract Infection by bacteria ,seven sample were identified the infection of, *E.coli* . Antibiotic susceptibility had been scanned for bacterial isolates by five antibiotic discs (Neomycin 30 mcg , Aztreonam 30 mg, Cefoxitin 30 mg, Meropenem 10 mg ,and Ciprofloxacin 5mg) .
To obtain silver nanoparticles (AgNPs) in a liquid form at a concentration of 2000 µg /ml , we dissolved 0.02 gm of AgNPs powder in 10ml of distilled water, using Ultra Sonication bath VGT / China , This represents the stock.
The antibiotic susceptibility had shown 7 isolate 100% was resist to the antibiotic Neomycin , Cefoxitin and Meropenem . The antibiotic susceptibility had shown 7 isolate 100% was high sensitive to the antibiotic Ciprofloxacin and Aztreonam . All seven isolate 100% was resist to the silver nanoparticles . The synergism effect between ciprofloxacin and AgNPs gave high activity against all *E.coli* isolates . Several studies must been done for see the ability of using silver nanoparticles as drug to reduce the using of antibiotics and to minimize antibiotics resistant by bacteria .

Keywords: *Escherichia coli* ; E.coli ; AgNPs ; silver nanoparticles ; Ciprofloxacin ; synergism effect ;

1. Introduction

Enterobacteriaceae

The Enterobacteriaceae are a family of rod-shaped Gram-negative bacteria that normally inhabit the gastrointestinal tract and are the most common cause of Gram-negative bacterial infections in humans. In addition to causing serious multidrug-resistant, hospital-acquired infections, a number of Enterobacteriaceae species are also recognized as biothreat pathogens [1] . Most species grow well at 37°C, although some species grow better at 25- 30°C. They are facultatively anaerobic, oxidase negative and catalase positive (except *Shigella dysenteriae type 1 and Xenorhabdus* species), they are distributed worldwide and may be found in soil, water, plants and animals [2] .

Enterobacteriaceae ferment a variety of carbohydrates, but their ability to produce acid and gas from the fermentation of D-glucose is one characteristic that remains an important diagnostic property and is commonly used as a basis for their detection and enumeration. Some members of the Enterobacteriaceae (e.g., *Enterobacter spp., Escherichia coli, Citrobacter spp. and Klebsiella spp.)* can be recognised using methods that exploit their ability to ferment lactose rapidly (usually within 24-48 h) producing acid and gas [3] .

Escherichia coli was described in 1885 by a German pediatrician and bacteriologist Theodor Escherich [4,5] , whilst trying to find out the cause of fatal intestinal diseases in children, was a rod-shaped microbe that could grow quickly and that he called *Bacillus communis coli*. After his death, these microbes were dubbed after his name *E. coli* by Castellani and Chalmers in 1919 [6] . The bacteria are gram negative, rod shaped, non-spore forming, motile with peritrichous flagella or nonmotile, and grow on MacConkey agar (colonies are 2 to 3 mm in diameter and red or colorless and are capable of aerobic or anaerobic growth**)** [7] . Filamentous cells of *E. coli* are long, multi-nucleoid, and form when normal cells elongate and replicate their DNA, but do not septate and divide [8] .The bacterium can be grown easily and inexpensively in a laboratory setting, and has been intensively investigated for over 60 years. Remarkable works has been done throughout the world [9,10,11] .

Antibiotic Resistance

World health leaders have described antibiotic resistant microorganisms as "nightmare bacteria" that "pose a catastrophic threat" to people in every country in the world.[12] ,the WHO reported an antibacterial resistance to 7 types of bacterial species, this chosen is regardless to The causing some of the most common infections in different settings; in the community, in hospitals or transmitted through the food chain (*Escherichia coli*, *Klebsiella pneumonia*, *Staphylococcus aureus* , *Streptococcus pneumonia*, *Nontyphoidal Salmonella*,*Shigella species* ,*and Niesseria gonorrhea*) [13].

Silver Nanoparticles: Synthesis Medical Application, and Toxicity Effects
Many methods have been described in the literature for synthesizing Ag-NPS including chemical, physical, photochemical and biological methods. Chemical

and physical methods have been widely used but their high consumption of energy and also being expensive, in addition to toxic substances produced; those methods are not proffered in Ag-NPS synthesis. Biological methods instead provide an ecofriendly, feasible alternative that are economic and relatively faster and usually employs microbes and plants [14] .

Medical Applications of Silver nanoparticles

The aim of using AgNps in medical applications is the prevention of bacterial colonization and Reduction of inflammation. AgNps increase wound healing through modulation of various cytokines and decreasing matrix metalloproteinase (MMP) levels and enhanced cellular apoptosis. It prevents bacterial infection and improves wound healing [15, 16] .

Anti-inflammatory property of AgNps

In a porcine contact dermatitis model (induced by dinitrochlorobenzene), it was found that nanocrystalline silver uniquely treated DNCB-induced erythema and edema, increased apoptosis in inflammatory cells, and suppress MMP and Pro-inflammatory cytokine activity such as (interleukin-6 (IL-6) and tumor necrosis factor-α (TNF-α) [17] . AgNps has anti-inflammatory activity independent of its antimicrobial activity.

Silver nanoparticles as antimicrobial agents

Because of outbreak of the infectious diseases caused by different pathogenic Microorganisms and the development of antibiotic resistance, scientists are searching for new antibacterial agents. AgNps interact with microbes and cause several damages to them. Activity of AgNps on microbes [18, 19] .

2. Materials and Methods

CIPROFLOXACIN liquid Solution

The antibiotic is ready to use. Serial dilutions (duplicate) prepared from the stock solution of ciprofloxacin , with deferent concentrations (1000 ,500 ,250 ,125 ,62.5 ,31.25 , 15.625 , 7.812 ,3.906 ,1.953 ,0.976 ,0.488 µg /ml).

Silver NPs liquid prepared

To obtain AgNPs in a liquid form at a concentration of 2000 µg /ml , we dissolved 0.02 gm of AgNPs powder in 10ml of distilled water, using Ultra Sonication bath VGT / China , This represents the stock. Serial dilutions (duplicate) prepared from the stock solution of AgNPs , with deferent concentrations (1000 ,500 ,250 ,125 ,62.5 ,31.25 , 15.625 , 7.812 ,3.906 ,1.953 ,0.976 ,0.488 µg /ml). [20,21,22]

Antibiotic sensitivity-Kirby-Bauer disk diffusion susceptibility test

Antimicrobial susceptibility testing was performed by Kirby-Bauer tes ,in brief:[23]

Overnight bacterial growth suspension was adjusted to McFarland 0.5. The bacterial suspension was spread on the surface of the Muller-Hinton agar plate by a sterile cotton swab in three different planes (by rotating the plate approximately 60º each time) to obtain an even distribution of inoculums throughout the plate. The inoculated plates were then placed at room temperature for 30 minutes to allow absorption of excess moisture. Subsequently, the antibiotics disks were placed to the agar surface by sterile forceps. Finally, the plates were incubated at 37°C for 24 hrs. The resultant diameter of the inhibition zone of each antibiotic disk was measured by a metric ruler and the results were recorded as resistant, sensitive, or intermediate resistant following the breakpoints of CLSI (2020). The antimicrobial susceptibility testing for : NEOMYCIN 30 mcg, AZTREONAM 30 mg, CEFOXITIN 30 mg, MEROPENEM 10 mg ,and CIPROFLOXACIN 5mg .

Detection Minimal Inhibitory concentrations (MICs) of Ciprofloxacin and AgNPs against *E.coli*

The test was done using microtitre plates using the broth microdilution [24]

A. In a 96-well flat-bottom microtiter plate, 100 µl of double strength Muller-Hinton broth was distributed from the 1st to the 12th well in each raw.

B. A volume of 100 µl of ciprofloxacin solution (2000 µg/ml) was pipetted into the 1st test wells of each microtiter raw and mixed well with the broth.

C. A separate and sterile pipette was used to transfer 100 µl of the mixture in the first well into the second well and mixed thoroughly. Again, 100 µl of the mixture was transferred from the second well into the third well and mixed thoroughly. This Serial dilutions (duplicate) was continued to the 12th well.

Lastly, 100 µl was removed from the eleven well and discarded. The final concentration of antibiotics was now one-half of the original concentration in each well.

D. The 11th well and 12 in raw 8 was left as a control positive (antibiotic-free control well and antibiotic control well).

E. Then, 10 µl of overnight diluted bacterial suspension, adjusted to a 0.5 MacFarland turbidity standard, was added into all wells and mixed thoroughly.

F. the same steps were repeated, but using liquid AgNPs prepared at the same concentration of the antibiotic (2000 µg /ml) .

G. the same steps were repeated, but using 50 microliters of liquid AgNPs prepared with the same concentration of antibiotic and 50 microliters of antibiotic.

H . The lowest concentration which show no growth was considered as the Minimum Inhibitory Concentration (MIC).

Study of synergism effect between *antibiotics and AgNPs*

In the combination assay, the bacterial cells were grown in the MHb as described above. (50 µl) of 2000 µg /ml of AgNPs was added to 96-well plate containing 100 µl of the media and 50 µl of the antibiotic and then add 10 µl of bacteria . this done by Serial dilutions (duplicate) . The cultures were kept at 35 ºC for 20 hours. The bacterial growth compared with the bacterial growth in the present or absent of the antibiotics, and the present of AgNPs alone. The antibiotics that used in this essay were CIPROFLOXACIN (2000 mg/ml).[25,26,27]

3. Results and Discussion

Isolation and Identification of *E.coli*

Seven isolates were achieved from urinary tract infiction (UTI) samples .All the samples were cultured primarily in Brain-Heart Infusion (BHI) broth at 37ºC for 18-24 hrs, then subcultured onto the MacConkey and Eosin methylene blue (EMB) agar by streak plate method [28] to observe the colony morphology (shape, size, surface texture, edge and elevation, colour, opacity etc). The organisms showing characteristic colony morphology of *E.coli* was repeatedly subcultured onto Eosin methylene blue (EMB) agar until the pure culture with homogenous colonies were obtained. The colonies of *E.coli* on MacConkey agar appeared as bright pink colonies (Lactose fermentor) as shown in figure (3-1), whereas on EMB agar appeared as metallic sheen colonies figure (3-2).

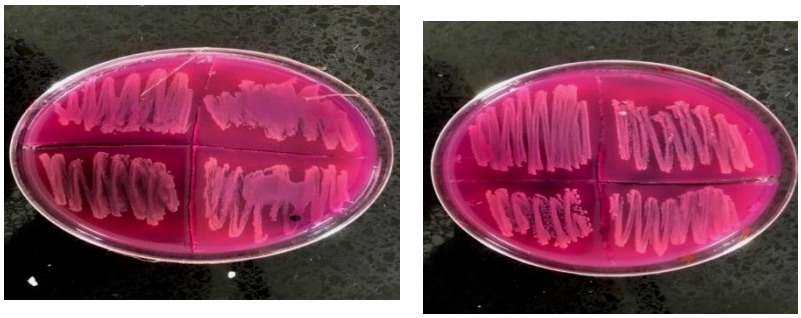

Figure (3-1): *E.coli* on MacConkey agar (L.F).

MacConkey agar and EMB agar are selective for Gram-negative bacteria and differential between lactose fermented & non-lactose fermented E.coli on EMB agar have a characteristic green metallic sheen .

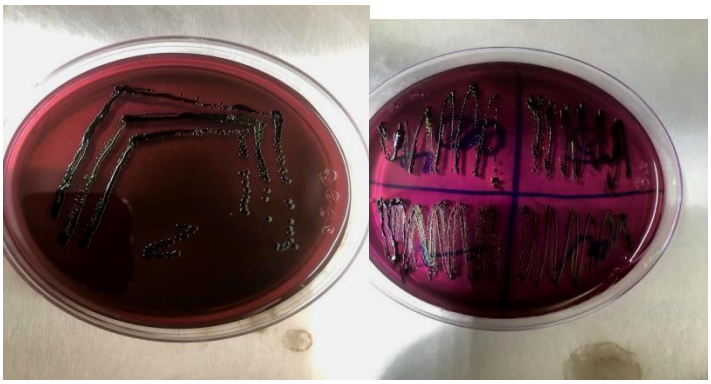

Figure (3-2): *E.coli* on EMB agar

Antibiotic susceptibility

The antibiotic susceptibility for the isolates showing different ability to act towards the antibiotic . depending on the bacterial isolates itself ,antibiotics ,as it seen in table (3-1) , figure (3-4) and figure (3-3) .

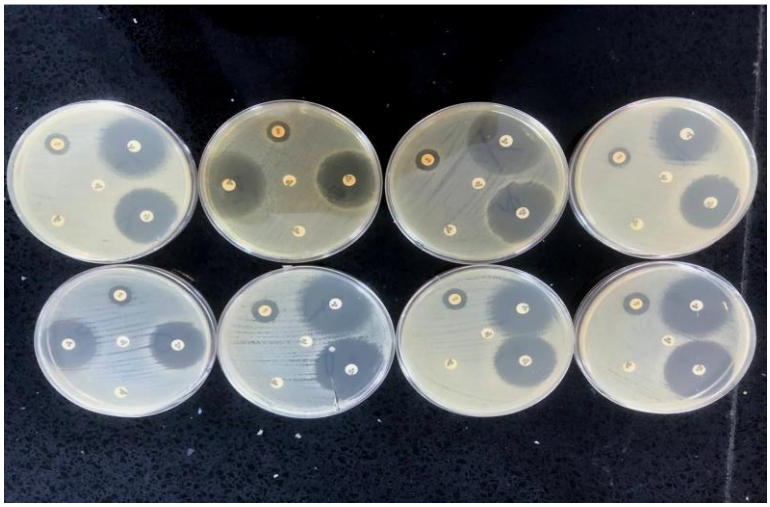

Figure (3-3) : Antibiotic susceptibility for bacterial isolates

Table (3-1) : the an ceptibility f ed UTI isolates

bacterial isolates	CIP 5	ATM 30	N 30	FOX 30	MEM 10
E.coli 1	34 S	35 S	14 R	R	R
E.coli 2	32 S	31 S	12 R	R	R
E.coli 3	35 S	35 S	15 R	R	R
E.coli 4	30 S	29 S	12 R	R	R
E.coli 5	31 S	31 S	11 R	R	R
E.coli 6	38 S	35 S	12 R	R	R
E.coli 7	32 S	31 S	12 R	R	R

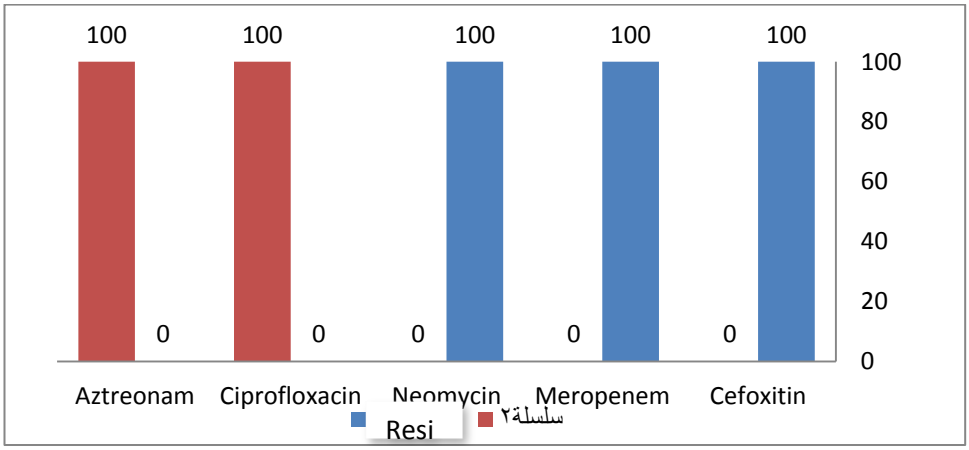

Figure (3-4) : percentage of Antibiotic susceptibility for bacterial isolates

We can notice that all 7 isolate 100% was resist to the an Sensitive OMYCIN , CEFOXITIN and MEROPENEM [29] when the sensitivity to CIPROFLOXACIN and AZTREONAM was high with a ratio 100% in 7 isolates .

From the result we can notice that the most resistance antibiotic was for NEOMYCIN , CEFOXITIN and MEROPENEM , and this may be a reference improve for spreading of antibiotic susceptibility strains worldwide .

Detection Minimal Inhibitory concentrations (MICs) of Ciprofloxacin and AgNPs against *E.coli*

Minimum inhibitory concentration of Ciprofloxacin and Ag-NPs To determine the lowest concentration that completely inhibited visible growth, the minimum inhibitory concentration (MIC) was used. The MIC of Ciprofloxacin and Ag-NPs against *E. coli* are shown in Fig (3-5) (3-6) respectively .

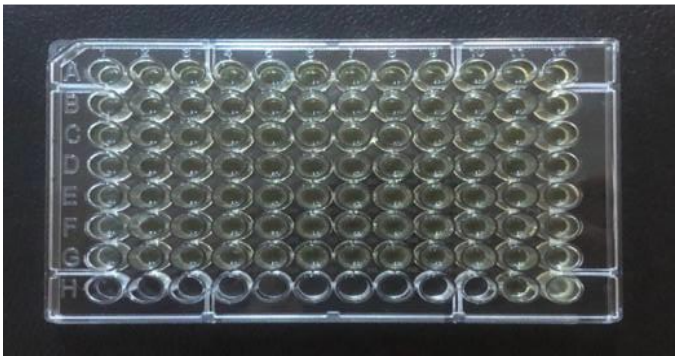

Figure (3-5) , the MIC of Ciprofloxacin against *E.coli* .

showing that the MIC of Ciprofloxacin against *E. coli* was 0.488 µg /ml.

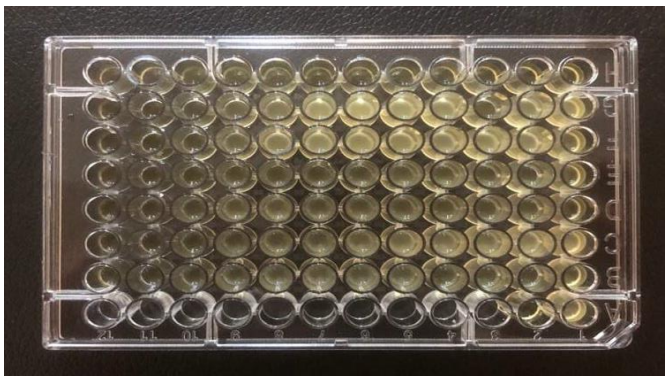

Figure (3-6) , the MIC of Ag-NPs against *E.coli* .

the MIC of Ag-NPs against *E. coli* was nil .

Study of synergism effect between *antibiotics and AgNPs*

The result has shown synergism effect between the Ciprofloxacin and *AgNPs* as seen in figure (3-7)

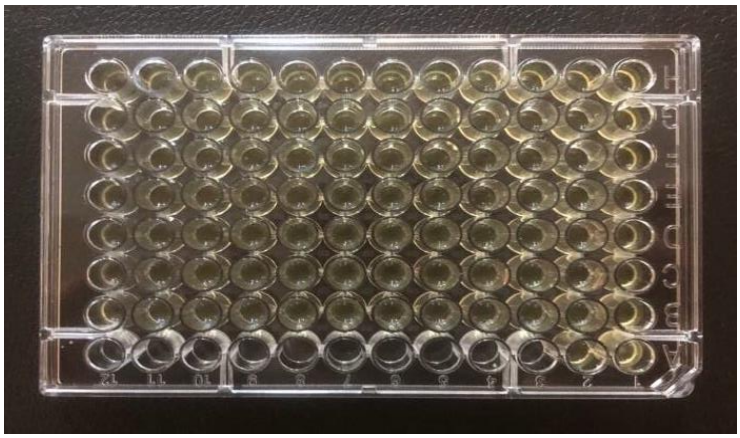

Figure (3-7) synergism effect between antibiotics and AgNPs

In the issue of spreading strains of multidrug resistant bacteria ,the bacterial spices become more resistant to the known antibiotics so the need to development a new antibacterial materials is become more important .one of the most known antibacterial is nanoparticles , nanoparticles is the one of the most known antibacterial [(76)] , in this study the result had shown this difference between increasing and diminished in the inhibition zone and this can be a result for the bridge that modified between the active compound in nanoparticles and the antibiotic that made a block to connected spots which give the activity for it from the other side is the connected of the active compounds in nanoparticles is the indicator for antagonism effect[(35)] .

4 Conclusions

1. AgNPs had no effect against all bacterial isolates .

2. All bacterial isolates were showed high sensitivity for ciprofloxacin .

3. The synergism effect between ciprofloxacin and AgNPs gave high activity against all *E.coli* isolates .

5 Recommendations

1. Evaluate the MIC for other type of antibiotics .

2. Study the effect of other type of nanoparticles against E.coli .

3. Study the effect of AgNPs against other bacterial species .

4. Study the synergism effect between other types of nanoparticles and antibiotic or plant extacts .

5. The use of a lower concentration in the synergism effect between the antibiotic and the AgNPs .

6. Use an antibiotic to which bacteria are resistant .

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Thermodynamic study of urea removal from polluted water by adsorption on two surfaces of fly-ash and zeolite

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Abstract: The goal of this study was to find out if fly-ash from burning old paper could be used as a cheap material to absorb urea from sewage. There were batch experiments done to find out how contact time, removal of urea as operation of acidity value, and the amount of surface affected how much urea was taken up. EDX, SEM, XRD, and BET were utilized to explore the adsorbents' properties. Equilibrium experiments revealed that the optimal process conditions were 0.5 g of fly-ash and 1 g of zeolite loading with an initial urea concentration at temperature (20 °C), pH (8.0), and shaker speed (100 rpm). The efficiency of waste removal was shown to rise as pH was increased and decreasing temperatures. The Harkins-Jura and Freundlich adsorption models for fly-ash and zeolite could both accurately describe the isothermal data. The results show multilayer physical adsorption occurred on zeolite and fly ash surfaces. The study's findings suggested that fly-ash and zeolite could be employed as an inexpensive adsorbent for the cure of wastewater containing urea.

Keywords: Urea; Removal; fly-ash, Zeolite; Water pollution; Adsorption.

1. Introduction

Several pathways lead urea to the sewers and enter the sewage system. Urea is abundant in both human urine and agricultural wastewater because it is widely utilized as nitrogen fertilizer. There are a number of issues that can arise from urea-containing wastewater, including eutrophication, the growth of algae, and the release of ammonia, which is hazardous to aquatic life. [1]. This makes the process of removing urea from wastewater crucial in a wide variety of industries. As part of tighter environmental rules, it is crucial to reduce the amount of urea found in effluent from wastewater treatment plants. Researchers have investigated several different methods for getting rid of urea. These include biological, enzymatic, electrochemical, adsorption, and other methods [2]. Adsorption is a physiochemical process that, through physical and chemical interactions, plays a significant role in the movement and fate of pollutants in both manmade and natural aquatic systems. [3]. Adsorption is widely regarded as the most cost-effective treatment strategy for drastically decreasing dissolved pollutants in designed treatment systems. [4]. Wastewater can be treated with a variety of adsorbents, including activated carbon, activated alumina, silica gel, zeolites, cashew nutshells, nanoscale zero-valent iron, and other adsorbents [5-7]. The adsorption of organic chemicals and heavy metals by activated carbon

has been demonstrated to be effective [8]. Some of the most promising techniques for detoxifying wastewater of harmful and ecologically undesirable compounds, such as amines, are adsorption on solid surfaces and heterogeneous catalysis. Even if adsorption can take place on a wide range of surfaces, only a select handful are known to have adsorptive efficiency or reactive surfaces sufficiently favourable for adsorbing organic molecules. A few examples are zeolites, activated carbon, and metal oxide systems [9,10].

High surface area activated carbon is now the most popular adsorbent for use in environmental clean-up. [١١-13]. Chemical catalysis, one of the many potentials uses for materials with a large surface area (nanoscale materials), is attracting a lot of attention. These materials are distinctive because of two features: (I) having extensive surface areas that are open to interactions, and (II) their elevated surface reactivities due to their richness in reactive, coordinatively unsaturated locations, typically edges, corners, and kinks [14]. The findings of a recent study that we conducted on the adsorption of urea by high surface-area fly-ash and zeolite are presented in this document. because of the presence of many different types of hydroxide groups on its surface.

Low-cost adsorbents with metal binding capacity can be made from naturally occurring materials found in specific places. As a key microporous adsorbent, zeolites can be found in nature or manufactured in a lab. Their ion exchange capabilities and status as selective adsorbents are also noteworthy [15].

As far as we can tell, no one has yet documented employing fly-ash and zeolite to purge urea from wastewater. So, this study was done to see if fly-ash and zeolite could remove urea from wastewater through adsorption and to see how well it worked compared to other surfaces used in other studies.

2. Preparation Techniques and Characterization

2.1. Preparation of surface

According to the Surface of fly-ash, wastepaper is cleaned with pure water to get rid of dust and suspended matter before being burned in an oven at 800°C for 2 hours to turn it into fly-ash, then ground with slurry and sieved to shape it. 200 µm sample size.

2.2. Characterization of surfaces

Chemical characteristics of zeolite and fly-ash before and after interaction with urea are analysed using SEM analysis. The Brunauer, Emmett, and Teller (BET) method is used to calculate the adsorbents' specific surface area and pore

porosity. About 200 mg of samples were heated to 350 °C in a vacuum for 5 hours. Nitrogen gas was then used as the adsorbent, and adsorption-desorption isotherms were plotted using the apparatus Quanta Chrome Autosorb. The pore diameter and pore volume were obtained using Barrett Joyner Halenda (BJH) models. X-ray diffraction was used to attain information on the crystalline structure of the adsorbent samples. A Bruker diffractometer with a CuKα radiation source (λ = 1.5406) was used to take the measurements (Shimadzu XRD 6000). Step-scan mode was used for this XRD measurement, with the diffracted X-ray intensities being recorded at 0.027° intervals throughout a 2θ range of 10-80°. At 40 kV and 4 seconds per step, the diffractometer performs admirably. These absorbents were described by their morphologies and structures. using a Hitachi TM3000 scanning electron microscope at a voltage of 15kV and magnifications of up to 35X and a Bruker Quantax 70 EDS system for elemental analysis.

2.3. urea adsorption process

A solution of urea with a concentration of 500 mg/l was prepared. 40 ml of different concentrations (10–50 mg/l) of urea sample were added into a conical flask containing the powder of each of the ashes (0.5 g) and zeolite (0.1g). Then it was placed in a controlled water bath with a temperature of up to 293 K (equipped with a vibrator), and after shaking for a specific period that varies from one surface to another, the centrifuges were used on the solutions. at 5000 rpm for 10 minutes and then filtered to get rid of the adsorbed surface particles. After that, the supernatant liquid was analysed for urea molecule concentration. After adsorption of urea was completed, Filtration was used to separate the samples of zeolite and fly-ash, and they were then dried at 60 ˚C for 24 h in an oven. The amount of adsorbed urea was calculated based on Equation (1), where A_{eq} represents the amount of adsorbed urea (mg/g), C_i represents the primary concentration (mg/L), C_f represents the ending concentration (mg/L), V_{sol} is the volume of urea solution, and M is the mass of the surface [16].

$$A_{eq} = \frac{(C_i - C_f)\, V_{sol}}{M} \qquad (1)$$

2.4. Mathematical Isotherm models

Urea adsorption capacity was calculated using five different isothermal models: the Langmuir, Freundlich, Timken, Dubinen, and Harken-Jura. The assumption of maximal adsorption capacity underlies the Langmuir isotherm, which is in turn connected to monolayer adsorption on a uniform surface. A linearised version of the Langmuir type, represented by the following equation, was used for this study [17,18]:

$$\frac{C_{eq}}{A_{eq}} = \frac{1}{q_m k_L} + \frac{C_{eq}}{q_m} \qquad (2)$$

where C_{eq} is the urea concentration at equilibrium, (q_m and k_L) are Langmuir constants, A_{eq} is the capacity of adsorption at equilibrium.

Applications of the Freundlich isotherm can be found in systems with a heterogeneous surface, identified by the heterogeneousness constant (1/n). Here is the model's linear form [19]:

$$log\ A_{eq} = log\ K_f + \frac{1}{n} log\ C_{eq} \qquad (3)$$

where K_f represents Freundlich constant, and $\frac{1}{n}$ quantifies the strength of the adsorption and provides insight into the relevance of the adsorption.

The Temkin isotherm model is created on the strong electrostatic interaction, where k_T is the change in adsorption energy. It is assumed that the heat of adsorption for all of the molecules in the layer goes down as a result in a linear way as coverage increases. The following equation describes the linear form used in this investigation [20]:

$$A_{eq} = Bln\ k_T + B\ lnC_{eq} \qquad (4)$$

where B is related to the heat of adsorption $B = \frac{RT}{b}$, T= the absolute temperature (K), R = a gas constant (8.314 J mol−1 K−1), b=Temkin constant, k_T represent the equilibrium binding constant.

Dubinin isotherm is used to learn more about the adsorption process and its characteristics. In this model, a monolayer adsorption capacity is assumed, but otherwise, the surface is assumed to be heterogeneous, and the sorption potential is assumed to be constant [21].

$$lnA_{eq} = lnq_m - \beta\ \varepsilon^2 \qquad (5)$$

$\varepsilon = RT\ Ln\ (1+1/C_{eq})$ (6)

where q_m represents the monolayer saturation capacity, and β is the Dubinin isotherm constant which gives the average amount of free energy released during the sorption process for each molecule of the sorbate. Assuming the adsorbed layer is of the condensed kind, the Harkins-Jura adsorption isotherm (equation 7), originally developed for gas-solid systems, can be used to solution-solid systems as well. Activated charcoal is used to verify the expanded Harkins–Jura adsorption isotherm for eleven distinct systems [22].

$$\frac{1}{A_{eq}^2} = \left[\frac{B}{A}\right] - \left[\frac{1}{A}\right] log C_{eq} \qquad (7)$$

where A and B are the Harkins model constants.

3. Results and discussion

3.1. Sorbent characterization

Differences between zeolite and fly-ash in terms of surface area, pore volume, and pore diameter are summarised in Table 1. Mesoporous zeolite is preferable as an adsorbent because of its high surface area, while fly-ash has a lesser surface area. Because of this, if the pores in the mesoporous zeolite were totally filled, it might be able to adsorb more urea than ash. From figure 1, the isotherms' general form suggests that the adsorption is multi-layered, as defined by the IUPAC [23].

Table1. Surface area of adsorbents, pore volume, and pore diameter.

Adsorbents	Surface area (m^2/g)	pore volume (cm^3/g)	Pore diameter (nm)
Zeolite	12.431	0.073	23.501
Fly-ash	7.716	0.020	10.583

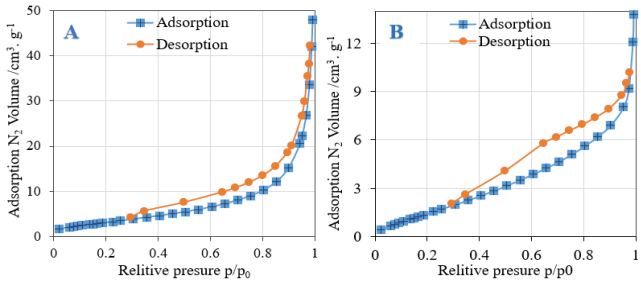

Figure 1. Nitrogen adsorption desorption isotherms for : (A) Zeolite, and; (B) Fly-ash at 77 K.

The data show that the crystalline structure is present when there are sharp peaks on the surface or when the material has been subjected to heat treatment at various temperatures. Both sorbents rely on (silicon oxide SiO2), an inorganic compound with a hexagonal crystal shape, as their primary crystalline component. As shown in Figure 2, (A) zeolite and (B) coal fly-ash was analysed using XRD. It has been confirmed that (CaAl2Si2O8) and sodium nitrate hydrate (Na2N2O3H2O) are present. The peak found at 2 θ = 29.23 is attributed to silicon oxide, whereas the peaks found at 2 θ = 31.84 and 2 θ = 36.18 are attributed to sodium nitrate hydrate and calcium titanate, respectively. Scherrer's equation can be used to determine crystal sizes of crystalline materials, as narrower peaks result from larger crystallites [24]. The crystallite sizes of the zeolite and fly-ash particles were 56.291 and 57.319 nm, respectively, which were calculated from the X-ray diffraction peaks via Scherrer equation 8.

$$D = \frac{0.9\lambda}{\beta.COS\,\theta} \qquad (8)$$

where λ is the X-ray source's wavelength (in this case, CuKα), β is the angular breadth at half maximum intensity of the diffraction peak, and θ is the Bragg angle.

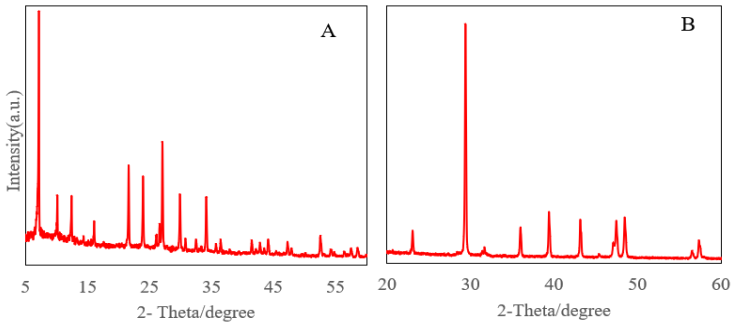

Figure 2. XRD diffraction pattern of : (A) zeolite and; (B) fly-ash

The physical morphologies of sorbent material particles are represented by SEM images. The sorbents have a heterogeneous porous structure, as shown in Figure 3, consisting of a non-uniform variety of porous shapes. The raw fly-ash was scanned using a scanning electron microscope (SEM) and is displayed in Figure 3 B. The image shows a variety of small, spherical particles as well as some agglomerates. Figure 3A reveals the porous structure of zeolite sorbent, which is heterogeneous in nature with a non-uniform porous shape mixture [25].

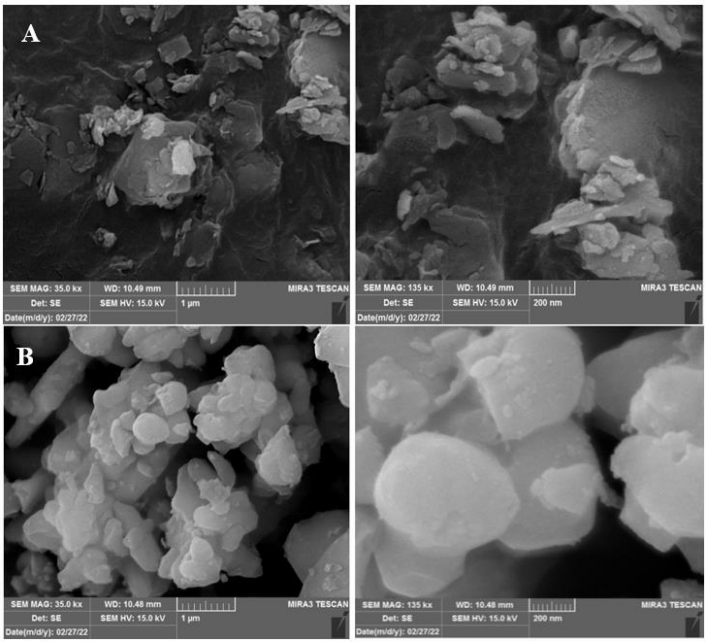

Figure 3. SEM images of: (A) zeolite and ; (B) fly-ash at different magnifications.

3.2. Estimate the adsorbent's weight, pH, and contact time needed to achieve equilibrium.

Before beginning the adsorption process, the first step is to look at the amount of sorbent and the time it takes to reach equilibrium. To determine the weight of the adsorbent material that provides the greatest amount of adsorption, different weights for the surfaces should be chosen within the range (0.05–2 g) and placed directly in volumetric flasks with 40 ml of urea solution at a concentration of 40 mg/L. Absorbance was measured after 2 hours in the vibrator at 20 C˚, it was filtered, and after obtaining all the readings, the weight that gave the least absorbency was determined, which is 0.5 g for the fly-ash surface and 0.1 g for zeolite. As for determining the time needed for equilibrium to occur between the sorbent surface and the adsorbent, 20 volumetric vials of 50 ml were taken, and 40 ml of urea solution at 40 mg/l were placed in them directly with the above-mentioned surface weights. They were placed in a vibrator at 20 °C and withdrawn at different times every ten minutes. The solution was filtered, and the absorbance was measured to determine the change in concentration with time. The best one for obtaining equilibrium is 110 min for fly-ash and 15 min for zeolite. The effect of the solutions' acidity at different concentrations was studied in the adsorption of urea from aqueous solutions on zeolite and fly-ash at different values of acidity, as shown in Figures 4. The figure shows that the adsorption capacity increases with the pH of the solution, with a noticeable peak at pH 8. In general, urea uptake can be boosted or dampened depending on the starting pH value. This can be explained by the fact that the surface charge of the adsorbent shifts as the pH value change. The isothermal plateau capacity, or maximum adsorption capability, was raised from 1.7 (mg/g) at pH 4 to 3.4 (mg/g) at pH 8 and from 0.6 (mg/g) at pH 4 to 1.5 (mg/g) at pH 8 on zeolite and fly-ash respectively. Findings indicated that adsorption on sorbents rises with concentration and reach to the higher amount at pH 8. Increasing the pH value increases the concentration of OH, which in turn increases the number of negative charges on the surface. The rate of absorption increases because of this [26].

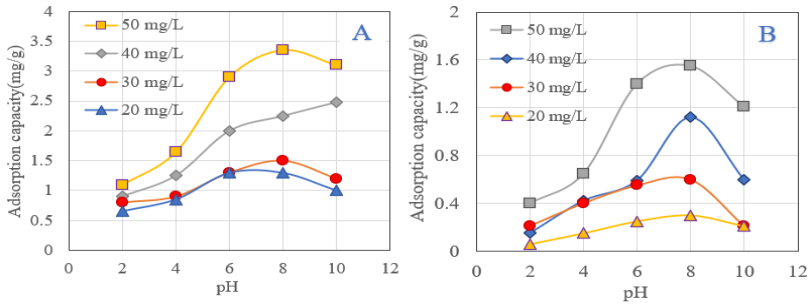

Figure 4. The effect of acidity on urea adsorption on: (A) zeolite and ; (**B**) fly-ash at 293 K

3.3. Adsorption of urea isotherms

Adsorption capacities of urea can be evaluated by monitoring equilibrium isotherms. Adsorption isotherms are useful for characterising the interaction between adsorbates and adsorbents. Five important isotherms models, namely Langmuir, Freundlich, Temkin, Dibnin and Harken-Jura were tested for fitting the experimental adsorption data (figures 5-9). The constants in models are very useful parameters for predicting adsorption capacities. The constant parameters of the linearized form equations of these isotherm models were calculated and listed in Table 2. Adsorption onto sorbents was evaluated by contrasting their respective R2 values. The experimental results were tested over the selected models, and the equilibrium data of sorbents showed a good correlation to the Freundlich and Harkin-Jura isotherms. The adsorption surfaces are heterogeneous, as indicated. Additionally, the urea adsorption is going to have multilayer coverage until the saturation of the active sites has occurred. it can be concluded that the Harken-Jura isotherm was fitting well for the adsorption of urea on zeolite and fly-ash.

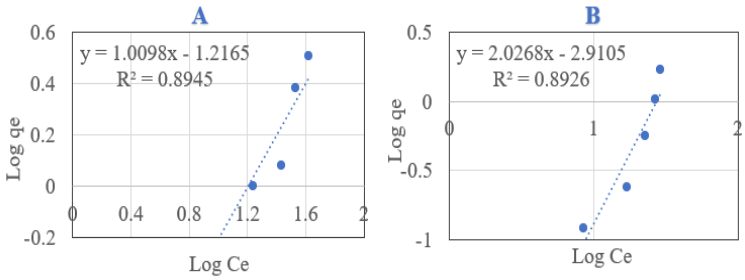

Figure 5. Freundlich straight lines for adsorption of urea on: (A) zeolite and ; (B) fly-ash at pH=8, and 293 K

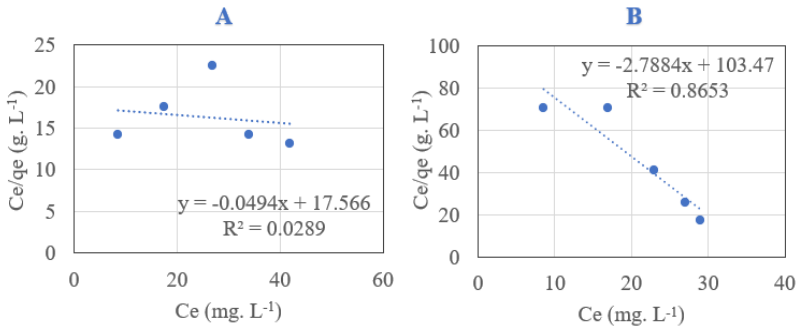

Figure 6. Langmuir straight lines for adsorption of urea on: (A) zeolite and ; (B) fly-ash at pH=8, and 293 K

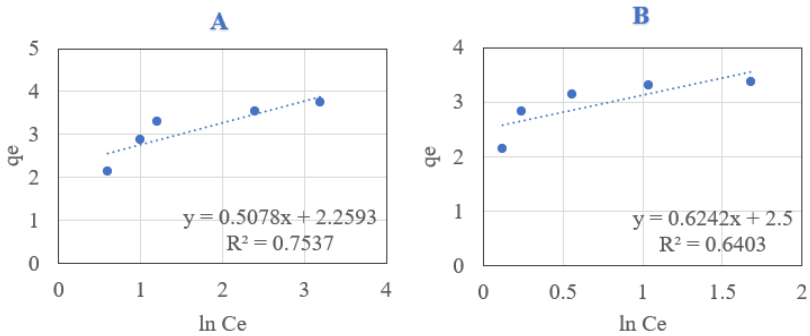

Figure 7. Temkin straight lines for adsorption of urea on: (A) zeolite and ; (B) fly-ash at pH=8, and 293 K

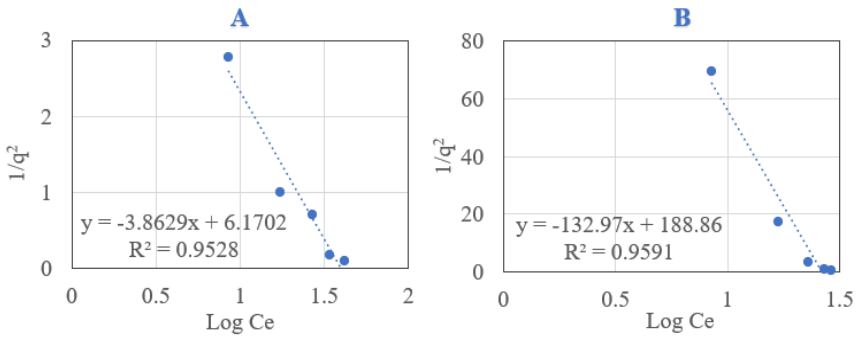

Figure 8. Harkin-Jura straight lines for adsorption of urea on: (A) zeolite and; (B) fly-ash at pH=8, and 293 K

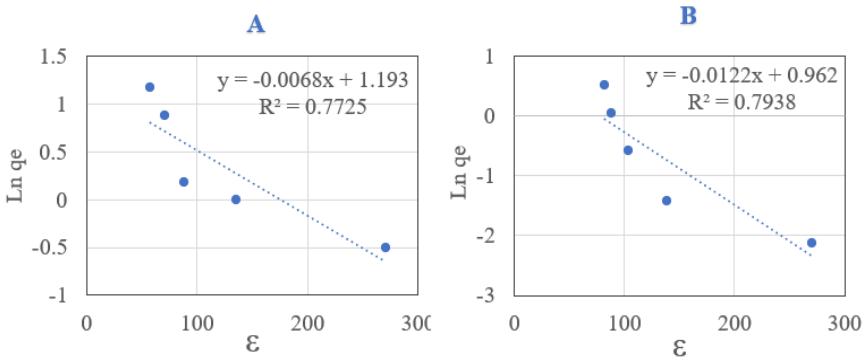

Figure 9. Dubinin straight lines for adsorption of urea on: (A) zeolite and ; (B) fly-ash at pH=8, and 293 K

From the correlation coefficient values R_2, Dubinin and Temkin isotherm is not adequate as Harkins-Jura or Freundlich isotherms and the lowest R2 values were to Langmuir model for zeolite. The Langmuir model isotherm shows the fit of the experimental data over the whole concentration range for fly-ash, and this is clear from the correlation coefficient in Table 2. According to the values of qm, the low values of qm (less than 1) indicate high and favourable adsorption of urea onto fly-ash [27]. Although the values of the heterogeneity factor (n) indicate that both zeolite and fly-ash have a heterogeneous structure, urea is more favourably adsorbed by the zeolite due to its greater n value. The experimental data for urea adsorption on both sorbents were best fit by the Harkin-jura isotherm, which was found to have high values of the correlation coefficient ($R_2 > 0.9$) when compared to the other four isotherm models used (the Langmuir, Freundlich, Dubinin, and Temkin models).

Table 2. Isotherm parameters for urea adsorption on zeolite and fly-ash.

isotherm models	**Zeolite**		
	R^2	Parameters	
Freundlich	0.895	n=0.990	Kf =1.217(L/mg)
Langmuir	0.029	KL=0.003 (L/mg)	q_m=20.243(mg /g)
Dubinin	0.773	q_m= 3.297(mg/g)	β=0.007(mol2/KJ2)
Temkin	0.754	KT= 85.55(L/mg)	B=0.508 (J /mol)

Harkins-Jura	0.953	A= 0.259	B=1.597
Fly-ash			
Freundlich	0.893	n= 0.493	Kf =2.911(L/mg)
Langmuir	0.865	KL=0.027(L/mg)	q_m=0.359(mg /g)
Dubinin	0.794	q_m =2.617 (mg/g))	β=0.012(mol2/KJ2)
Temkin	0.640	KT= 54.879 (L/mg)	B=0.624 (J /mol)
Harkins-Jura	0.959	A=0.008	B=1.420

3.4. thermodynamic Calculations of adsorption process

The adsorption of urea molecules onto Sorbents was further clarified by analysing the adsorption thermodynamic characteristics. From the experimental results shown in Figure 10, it can be concluded that zeolite possesses a high adsorption capacity, particularly at low temperatures. These results are consistent with some studies conducted on the adsorption of urea solutions on various surfaces [28,29]. Table 3 displays the results of the calculations performed on the thermodynamic parameters enthalpy, Gibbs free energy, and entropy. Enthalpy (ΔH) and entropy (ΔS) were determined using the van't Hoff equation [30] (equation9). To further understand the thermodynamic parameters, we can utilise the equilibrium constant K_A to calculate the change in Gibbs free energy of adsorption, which is given by (equation10).

$$lnK_A = \frac{\Delta S}{R} - (\frac{\Delta H}{R})\frac{1}{T} \qquad (9)$$

$$\Delta G = -RTlnK_A \qquad (10)$$

where R is universal gas constant (8.314 J.mo1-1k-1) and T is the absolute temperature (K). The change in enthalpy (ΔH) and entropy change (ΔS) is calculated from the slope and intercept of the plot of lnK_A against 1/T, respectively. A negative Gibbs free energy and a negative enthalpy value at all temperatures indicate that the adsorption is spontaneous, favourable, and exothermic for zeolite and fly-ash adsorbents used in the treatment. The lower

value of ΔG is a sign that adsorption on fly-ash is more spontaneous than adsorption on zeolite.

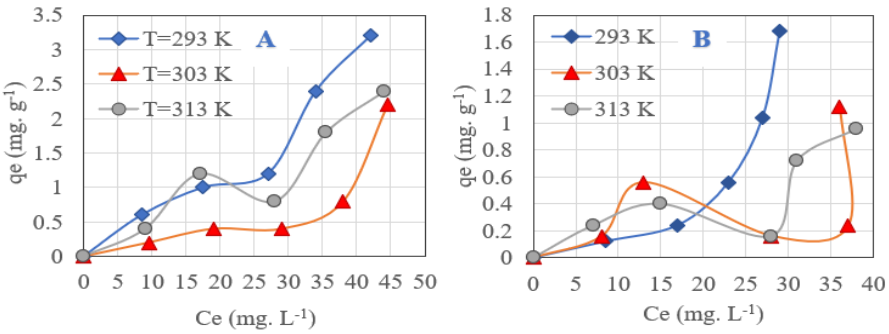

Figure 10. Temperature effect of urea adsorption on: (A) zeolite and ; (B) fly-ash.

Table 3. Thermodynamic parameters for adsorption of urea onto sorbents

Adsorbent	Thermodynamic parameters			
	ΔH kJ.mol^{-1}	ΔG kJ.mol^{-1}	ΔS J.mo1^{-1}k^{-1}	R_2
Zeolite	−11.159	−2.656	−29.019	0.901
Fly-ash	−21.435	−1.172	−69.158	0.945

4. Conclusions

Both zeolite and fly-ash have the capability to remove urea from wastewater by adsorption process. Adsorption is greatly impacted by the pH of the surrounding environment. Under the conditions of the experiments carried out here, a pH of 8 was shown to be optimal for the elimination of urea from aqueous solution. According to the results of the isotherm analysis, both the Freundlich and Harkins-Jura models can describe the urea sorption on zeolite. However, the Harkins-Jura model has a superior connection with the experimental data, as determined by the calculation of normalised deviations. Isotherm analysis on fly-ash, on the other hand, showed that all three of the Freundlich, Langmuir, and Harkins-Jura models could describe the urea sorption; however, it was determined that the Harkins-Jura model offers better correlation with the

experimental data. Two dipole-dipole interactions, one involving surface oxygen groups on the zeolite and fly-ash and the other involving the urea, are likely to be responsible for the adsorption. Furthermore, we propose that hydrogen bonding and other intermolecular interactions among urea molecules led to the formation of multilayer adsorption.

5. recommendations

Studying the possibility of preparing and complexing some metal ions with the urea derivatives, showing their adsorption capacity, and comparing it with the adsorption capacity of urea on zeolite and fly ash surfaces.

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