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Original Research Article

Design, Synthesis and Biological Activity of Pyrimidine Derivatives of Acetomido Chalcone of Crotamiton

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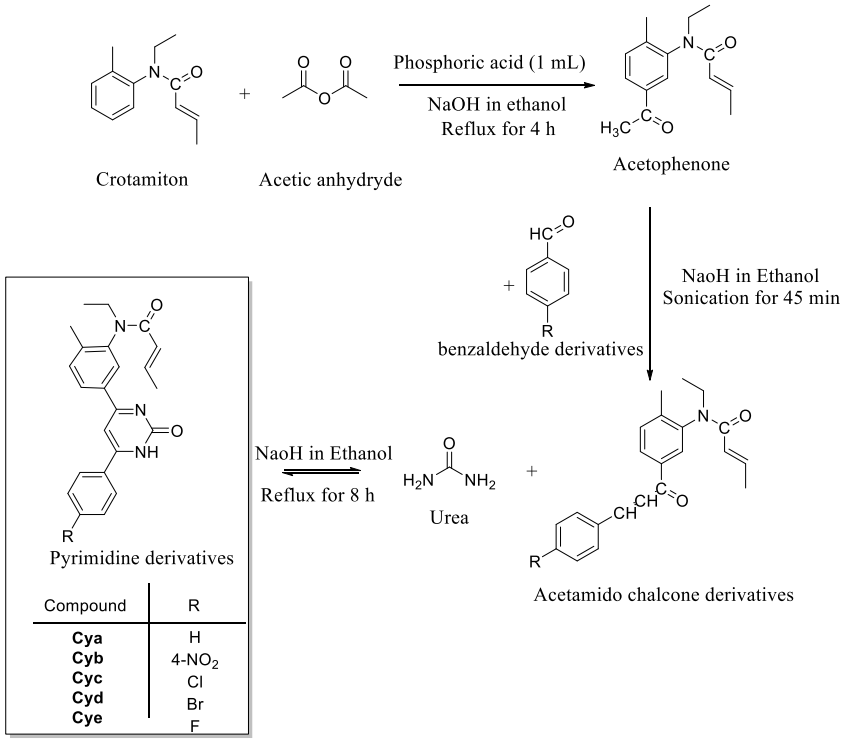
ABSTRACT

Docking studying of acetomido chalcone of crotamiton derivatives containing pyrimidines and a series of cyclic chemicals made via clasian Schmidt condensation reactions. Using identification methods (Thin-layer chromatography, Fourier-transform infrared spectroscopy, Ultraviolet, Nuclear magnetic resonance (NMR), and Mass spectrophotometric), chalcone chemicals interacted with substances like urea to produce a six-member ring including two nitrogen atoms. We examined five compounds' antibacterial action *in vitro* against gram-positive (*Staphylococcus aureus*) and gram-negative (*Escherichia coli*) bacterial strains. The recently synthesized chemicals, particularly **Cyb** appeared critical antibacterial movement against germs, comparable to routine medication, agreeing to examine their antibacterial potential. Moreover, a consideration *in vitro* against (*Candida albicans*) shows that crotamiton's antifungal action is well-targeted for official compared to standard medication crotamiton.

GRAPHICALABSTRACT



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Introduction

The development of medicinal chemistry depends on the conception, synthesis, and evaluation of novel chemical entities with potential therapeutic uses. The synthesis of pyrimidine derivatives which have various biological activities including antibacterial, anti-inflammatory, anti-fungal, and anticancer properties is one such area of study. Here, pyrimidine scaffolds combined with additional bioactive moieties provide a promising approach towards the synthesis of novel pharmacologically active compounds. The well-known acaricidal and antipruritic drug crotamiton successfully cures scabies and itching [1-3]. Research to enhance its therapeutic profile via structural modifications is still underway, notwithstanding its clinical utility. Antimicrobial resistance (AMR) is still a major worry in this century despite advancements in the development of drugs for infectious illnesses. Chalcone acetamido are heterocyclic nitrogen cores that are essential for several biological processes, such as anti-parasitic, anti-bacterial, and anti-fungal properties [4]. There are numerous distinctive natural and pharmacological exercises related with five-, six-, and seven-member heterocyclic moieties that incorporate one or two nitrogen molecules, such as pyrazole, oxazole, and pyrimidine, these exercises incorporate antioxidant, antibacterial, anti-inflammatory, and upper properties [5,6]. It is known that both gram-positive and gram-negative microbes, such as *Staphylococcus aureus* and *Escherichia coli*, may cause irresistible infections and are safe to anti-microbial. The basic action relationship (SAR) examination uncovered that the moiety is basic for antibacterial viability. Moreover, utilize of five-, six-, and seven-heterocyclic nitrogen platforms, pyrimidine progressed antibacterial adequacy [5-7]. Furthermore, the hydrophobic space in a natural atom can improve its antibacterial action and antifungal (*Candida albicans*) movement. Pyrimidine is a six-membered heterocyclic aromatic compound that shares structural similarities with benzene and pyridine, featuring two nitrogen atoms located at the first and the third positions. Pyrimidine exists in various natural forms and functions as a fundamental component for an extensive array of natural compounds, such as antibiotics, vitamins, and liposaccharides. Pyrimidines are primarily acknowledged as the fundamental components of RNA and DNA, with cytosine, thymine, and uracil being the most prevalent among them. Pyrimidine represents a crucial structural component present in a diverse array of chemicals, exhibiting significant biological activity and serving a vital function in the realm of drug discovery. Various synthetic characteristics demonstrated that pyrimidine derivatives are easy to synthesize and have different biological and chemical applications [8]. Pyrimidine and its derivatives are particularly interesting due to their broad biological potential, pyrimidines constitute six-membered unsaturated ring compounds composed of carbon and nitrogen, these compounds are prevalent in nature, exhibiting various forms characterized by nitrogen atoms located at positions 1 and 3 which bestow critical organic potential, counting antihypertensive, anticancer, antibacterial, anti-inflammatory, and antioxidant properties. Pyrimidine subsidiaries are an critical lesson of compounds in restorative chemistry due to their wide run of natural exercises, which incorporate antibacterial, anticancer, anti-inflammatory, and antiviral properties. Chalcones, on the other hand, are open-chain flavonoids that show an extent natural impact, counting anticancer, antioxidant, and anti-inflammatory qualities. The conjugation of chalcones with assorted bioactive moieties has demonstrated an increment of their pharmacological properties.crotamiton, a well-known anti-scabies and antipruritic medicine, is another atom worth looking at owing to its

therapeutic suggestions. Crotamiton's basic alter has the potential to make novel compounds with more noteworthy or broadened organic activity [9]. Combining the pharmacophores of pyrimidine, chalcone, and crotamiton into a single atomic system may be a promising procedure for producing unused bioactive compounds (The pyrimidine amalgamation, as shown in Scheme 1).

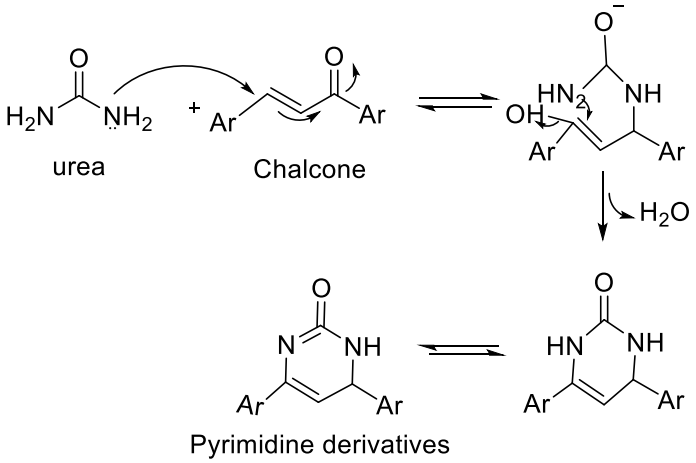
Organic exercises of pyrimidine incorporates anti-proliferative, antiviral, anticancer, anti-inflammatory, antibacterial, antifungal, anti-glucuronidase, against- Alzheimer's, and anti-tubercular capabilities, therapeutic chemists made and abused a extend of pyrimidine platforms. In addition, vitamins incorporate thiamine, riboflavin and folic corrosive have the pyrimidine ring [10,11].

Antimicrobial drugs are major weapons in battling the resistance to contamination delivered by microscopic organisms [12]. In later a long time, a spike in microorganism resistance to antimicrobial drugs has gotten to be a major wellbeing issue, requesting the creation of secure, capable, and novel antimicrobial specialists. Pyrimidine subordinates have the most grounded antibacterial movement against both gram-positive and gram-negative life forms. Numerous antimicrobial drugs are right now accessible on advertise, in any case their unpredictable utilize leads to the advancement of safe microorganisms. An unused lesson of dynamic antimicrobial treatments with moo or no side impacts is required [13]. This study focuses on the design, synthesis, and biological evaluation of pyrimidine derivatives of acetomido chalcone of crotamiton. The derivatives were synthesized through Claisen-Schmidt condensation reactions and characterized using a range of analytical techniques, including thin-layer chromatography (TLC), Fourier-transform infrared (FTIR) spectroscopy, ultraviolet (UV) spectroscopy, nuclear magnetic resonance (NMR), and mass spectrometry (MS). The biological activity of the synthesized compounds was assessed for their antibacterial and antifungal properties, with a particular focus on their efficacy against Gram-positive and Gram-negative bacterial strains as well as fungal pathogens.

Materials and Methods

Aim of the work

The objective of this work is to synthesize pyrimidine subsidiaries (**Cya**, **Cyb**, **Cyc**, **Cyd**, and **Cye**) from crotamiton's acetamido chalcone to upgrade range activity against organism *(Candida albicans*) and microbes (*S. aureus* and *E. coli*).



Scheme 1. Mechanism of pyrimidine synthesis.

Table 1. The instruments employed in biological activity

No.	Items	Company	Country
1	Mueller Hinton Agar	Mueller Hinton Agar	Turn
2	Hot plate Attractive stirrer	Hot plate Attractive stirrer	China
3	Glass Erlenmeyer Carafe	Glass Erlenmeyer Carafe	Germany
4	Autoclave	Autoclave	Chain
5	Hatchery	Hatchery	Chain
6	Circular Jar	Circular Jar	Germany

Fabric and tests

Acetone, deionized water, 37% formaldehyde, hydrochloric corrosive, urea, atomic strainer, ethanol outright, methanol supreme, sodium hydroxide NaOH, cyclobenzene, ethyl acetic acid derivation, condensation, hot plate, dichloromethane DCM, and TLC were utilized to assess the reaction's improvement. IR spectra were collected. NMR spectra were obtained utilizing DMSO and a mass spectrometer. Haitham *et al.* synthesized acetamidochalcone subordinates, which are unpublished (Table 1).

*Synthesis of pyrimidine derivatives from acetamidochalcone (**Cya**-**Cye**)*

In a 250 mL round-bottomed carafe, 0.01 mmol of acetamidochalcone subsidiaries (0.84 g of benzaldehyde, 0.96 g of 4-nitrobenzaldehyde, 0.92 g of 4-bromo benzaldehyde, 0.97 g of 3-chloro-4-methyl benzaldehyde, and 0.88 g of 4-florobenzaldehyde) were broken in 20 mL of ethanol, blended with 0.15 g (0.1 mmol) of urea, at that point include drops of NaOH to the blend until it gets to be fundamental media, at that point reflex for 8 hours [14]. Rf values was obtained by eluent cyclohexan and ethylacetate 9:1 for compounds **Cya**-**Cye**. The combination was filtrated to evacuate the accelerate employing a sifting pipe and channel paper, the dissolvable dissipated by turning, the remaining is a sleek substance.

*Compound **Cya***

$C_{23}H_{23}N_{302}$; M.W.: 373; 75% Yield; RF value: 0.45; λ_{max}: 210.5, 317; FT IR data (cm^{-1}): 3448 N-H extending amine, 1665 C=0 amide, and 1600 C=N pyrimidine; ^{1}H-NMR-data (400 MHz, DMSO-d_6, ppm): 2.50, (NH-CO) Proton of amide 7.392 in pyrimidine ring, triplet flag of three protons of aliphatic (-CH_3) in ethyl gather connected to nitrogen particle at 1.068-1.628 ppm, doublet flag of three protons of aliphatic (-CH_3) joined to ethylene bunch at 1.923-2.134 ppm, singlet flag of three protons of fragrant (-CH_3) joined to benzene ring at 3.322 ppm, multiple flag of two protons of (-CH_2-) in ethyl gather connected to nitrogen molecule at 3.996-4.013 ppmand 7.232-7.344 (m, 8H, Ar-H and CH-pyrimidine); ^{13}C-NMR (400 MHz, DMSO-d_6, δ, ppm): 13.10, 17.60, 18.00, 42.90, 122.24, 127.40, 128.60, 130.08, 136.22, 130.08, 131.67., 135.85, 136.22, 140.15, 164.44, 169.70, and 169.75; Mass: m/z (%): 373 [M^+].

*Compound **Cyb***

$C_{23}H_{22}(N_0)_4$; M.W.: 418; 80% Yield; Rf value: 0.30; λ_{max}: 205.5; FT IR data (cm^{-1}): 3107 N-H amine, 1664 C=0 amide, 1606 C=N pyrimidine; ^{1}H-NMR-data (400 MHz, DMSO-d_6, ppm): 2.50, (NH-CO) Proton of amide 7.385 in pyrimidine ring, triplet flag of three protons of aliphatic (-CH_3) in ethyl gather joined to nitrogen molecule at 1.019-1.047 ppm, doublet flag of three protons of aliphatic (-CH_3) joined to ethylene bunch at 1.898-2.127 ppm, singlet flag of three protons of fragrant (-CH_3) connected to benzene ring at 3.327 ppm, multiple flag of two protons of (-CH_2-

) in ethyl gather connected to nitrogen iota at 3.718-3.995 ppm. Protons of fragrant rings at 7.132-7.335 (m, 8H, Ar-H and CH-pyrimidine); ^{13}C-NMR (400 MHz, DMSO-*d*$_6$, δ, ppm): 13.12, 17.69, 18.07, 42.46, 122.78, 123.04, 127.02, 127.48, 128.66, 129.14, 130.08, 130.40, 140.68, 141.11, 141.25, 160.30, 164.49, 169.77, 169.81, and 170.33; Mass:m/z (%): 418 [M$^+$].

*Compound **Cyc***

$C_{23}H_{22}N_{302}Br$; M.W.: 415.5; 80% Yield; Rf value: 0.35; λ_{max}: 205.5, 323.5; FT IR data (cm^{-1}): 3436 N-H amine, 1651 C=0 amide, 1600 C=N pyrimidine; ^{1}H.NMR-data (400 MHz, DMSO-*d*$_6$, ppm): 2.50, (NH-CO) Proton of amide 7.512 in pyrimidine ring, triplet flag of three protons of aliphatic (-CH_3) in ethyl bunch joined to nitrogen particle at 1.020-1.054 ppm, doublet flag of three protons of aliphatic (-CH_3) connected to ethylene gather at 1.923-2.147 ppm, singlet flag of three protons of fragrant (-CH_3) connected to benzene ring at 3.418 ppm, multiple flags of two protons of (-CH_2-) in ethyl group attached to nitrogen atom at 3.787-4.013 ppm. Protons of aromatic rings at 7.133-7.500 (m, 8H, Ar-H and CH-pyrimidine); ^{13}C-NMR (400 MHz, DMSO-*d*$_6$, δ, ppm):13.65,17.02,1907,42.30, 122.67, 123.54, 127.02, 127.29, 128.23, 129.98, 130.60, 131.67, 140.72, 142.11, 142.25, 160.54, 167.12, 169.81, and 171.36; Mass:m/z (%): 415.5 [M$^+$].

*Compound **Cyd***

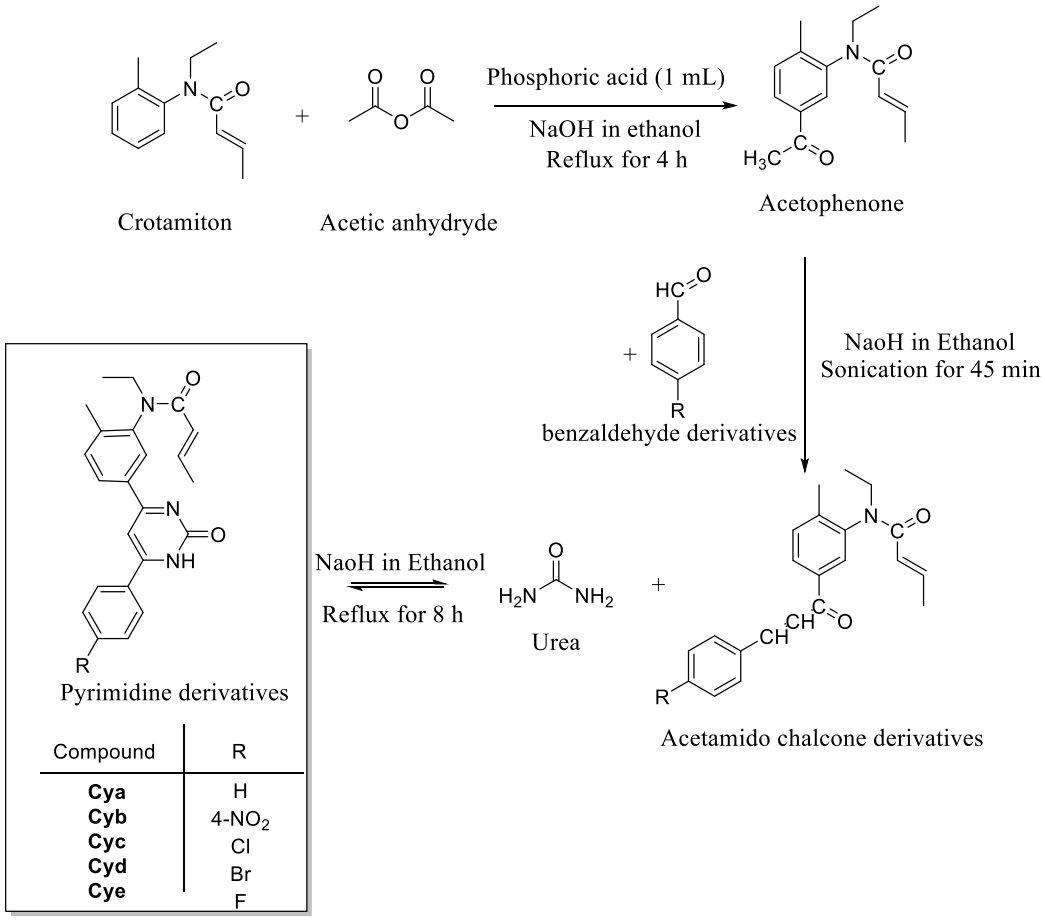
$C_{23}H_{24}N_{02}Cl$; M.W.: 421.5; 85% Yield; Rf value: 0.60; λ_{max}: 207, 271, 324; FT IR data (cm^{-1}): 3473 C-H amine, 1664 C=0 amide, 1629 C=N pyrimidine; ^{1}H-NMR-data (400 MHz, DMSO-*d*$_6$, ppm): 2.50, (NH-CO) Proton of amide 7.385 in pyrimidine ring, triplet flag of three protons of aliphatic (-CH_3) in ethyl bunch joined to nitrogen particle at 1.024-1.041 ppm, doublet flag of three protons of aliphatic (-CH_3) joined to ethylene gather at 1.914-2.137 ppm, singlet flag of three protons of fragrant (-CH_3) connected to benzene ring at 3.382 ppm, multiple flags of two protons of (-CH_2-) in ethyl group attached to nitrogen atom at 3.785-3.988 ppm. Protons of aromatic rings at 7.133-7.378 (m, 8H, Ar-H and CH-pyrimidine); ^{13}C-NMR (400 MHz, DMSO-*d6*, δ, ppm): 13.05, 17.55, 17.99, 42.90, 115.25, 122.80, 127.48, 127.68, 128.52, 129.17, 130.87, 131.66, 140.68, 141.72, 141.11, 157.86, 164.43, 169.70, 169.74, and 191.33. Mass: m/z (%): 421 [M$^+$].

*Compound **Cye***

$C_{23}H_{24}N_{02}F$; M.W.: 390; 65% Yield; Rf value: 0.40; λ_{max}: 210.5, 217.5; FT IR data (cm^{-1}): 3049 N-H amine, 1666 C=0 amide, 1629 C=N pyrimidine; ^{1}H-NMR-data (400 MHz, DMSO-*d*$_6$): 2.50, (NH-CO) Proton of amide 7.411 in pyrimidine ring, triplet flag of three protons of aliphatic (-CH_3) in ethyl bunch connected to nitrogen iota at 1.037-1.054 ppm, doublet flag of three protons of aliphatic (-CH_3) connected to ethylene gather at 1.937-2.160 ppm, singlet flag of three protons of fragrant (-CH_3) joined to benzen ring at 3.358 ppm, multiplet flag of two protons of (-CH_2-) in ethyl group attached to nitrogen atom at 3.781-3.985 ppm. Protons of aromatic rings at 7.161-7.349 (m, 8H, Ar-H and CH-pyrimidine); ^{13}C-NMR (400 MHz, DMSO-d6, δ, ppm): 13.04, 17.58, 17.78, 42.91, 122.79, 126.79, 127.61, 128.51, 128.62, 129.80, 130.05, 131.66, 140.69, 141.41, 141.11, 160.41, 164.48, 169.70, 169.75, 170.36, and 191.33. Mass:m/z (%): 390 [M$^+$].

Molecular docking approach

They decided the target protein for antimicrobial movement by applying the proper docking parameters to compare competitions between numerous docked stances and ligand Score. Miranda R. *et al.* [15].



Scheme 2. Synthesis of pyrimidine derivatives of crotamiton derivatives.

The precious stone structure of 7U4S, a target protein of *C. albicans*, was downloaded from the protein information bank homepage (https://www.rcsb.org/structure/7U4S) at a determination of 2.68 Å, which is respected a tall quality for docking studies [16]. The ideal RMSD esteem is generally 2 Å, with an vitality score underneath or break even with to -7 Kcal/mol. These two values are as often as possible utilized as approval criteria for atomic docking comes about, and the optimized altered for crotamiton (Compound 1 and crotamiton) atom has been docked into the receptor dynamic location of 1. albicans to explore the degree of interaction that happens and find a hypothetical relationship with the test antibacterial activity [17]. A virtual docking was done utilizing the Score of OCS as a reference ligand, and the foremost common All docking and scoring calculations were done utilizing the atomic working environment computer program (MOE) (Atomic Working Environment (MOE), 2022). Both altered crotamiton (compound 1 and crotamiton) and OCS atoms were sent beneath the indistinguishable circumstances [18]. The MOE program prepped the receptor protein by taking off water (dissolvable) particles within the dynamic location to ensure a hydrogen connection between the ligand and the target. X-ray diffraction appeared lost bonds within the protein structure, which were repaired and the protein protonated. The taking after optimization utilizes supported show creation and vitality refinement (Golden 10), amplified Hückel Hypothesis (EHT) drive.

Results and Discussion

Modified crotamiton-candida docking score in results

The kind of interaction ought to be the essential component that influences the quality of intelligently stances in arrangement to make an effective bio-complexed framework [19]. Table 2 appears the anticipated add up to official vitality as well as an assortment of intuitive between the 7U4S target protein and compound 1 and crotamiton to recognize the complexed ligand-protein structure that has the most noteworthy effect on microbial activity [20]. The target's by and large score of (compound 1 and crotamiton) (-6.3665 and -5.10528 kcal/mol) is reasonable for anticipating the display ligand's official affect in connection to the OCS control (-4.2293 kcal/mol). Likewise, within the same anticipated dynamic location, Furthermore, Figure 1 displays the studied ligand superimposed on the control OCS in the same predicted active site, where different interaction types were discovered in both docked complexes, A2 and OCS, such as the strong attractive conventional H-bond and carbon H-bond, which are commonly found in bio-complexed conformers. The most commonly interacting amino acids in both docked complexes are ILE16 and PHE88, with different interaction types in each. Other non-covalent interactions, such as π-π T-shaped, π-σ, and π-alkyl, were involved between the π- electrons of phenyl and π- electrons of benzene ring for the studied ligand (compound 1 and crotamiton) and several types of amino acids, such as GLY211, THR210, THR181, LYS56, and SER289. Compared to the control OCS, the non-covalent contacts contained π-anion and π-cation types linked P-O and π-bond of an amine aliphatic of the power with OCS151 and SER231, respectively. Unfavorable bumps are present in the docked control with bacterial enzyme, which reduces the stability of the complex. Other distributed appealing connections compensate for this unfavorable type [21]. Furthermore, certain amino acids implicated in the vdW interaction are distributed on the surface of the docked ligands, enhancing complex stability inside the active site.

Antimicrobial results

Mueller hinton agar prepare

Muller-Hinton made by putting 20 mL of the powder into 1 liter of refined water and after that warmed on a burner with shaking. M-H must be autoclaved for 15 minutes at 121 °C to be sterilized. At that point, it was permitted to cool to 50 °C sometime recently pouring into a petri dish, permitted for around 15 minutes for hardening time recently turned upside down, and kept within the fridge at 4 °C.

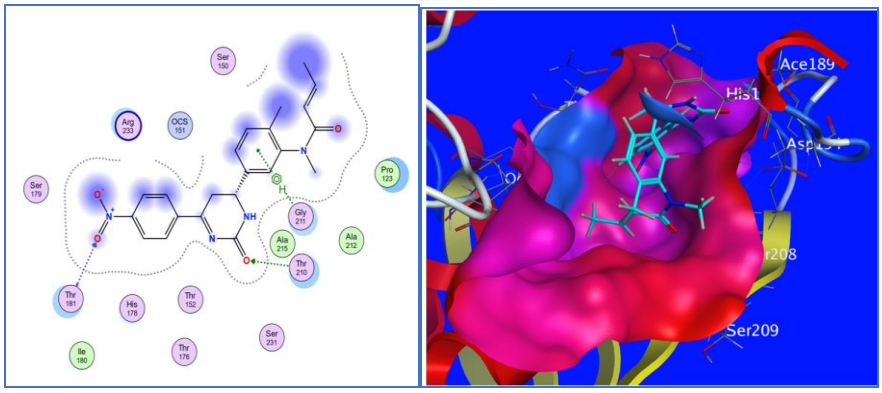
Anti-fungi movement

The anti-fungi capability of the created tests (CY-CL, CY-F, CY-4NO_2, CY-BE, CY-BR, and crotamiton) was examined against *Candida albicans* strains utilizing an agar well dissemination test [22,23]. Around 20 mL of Muller-Hinton agar was aseptically poured onto sterile Petri plates. The bacterial species were isolated from their stock societies employing a sterile wire circle. After refining the living beings, 6 mm-diameter wells were penetrated on the agar plates employing a sterile tip. Into the penetrated wells, different concentrations of the tests (CY-CL, CY-F, CY-4NO_2, CY-BE, CY-BR, and crotamiton) were utilized. The developed plates containing the Tests (CY-CL, CY-F, CY-4NO_2, CY-BE, CY-BR, and crotamiton) and the test living beings were hatched overnight at 37 °C recently measuring and recording the normal zones of restraint breadth.

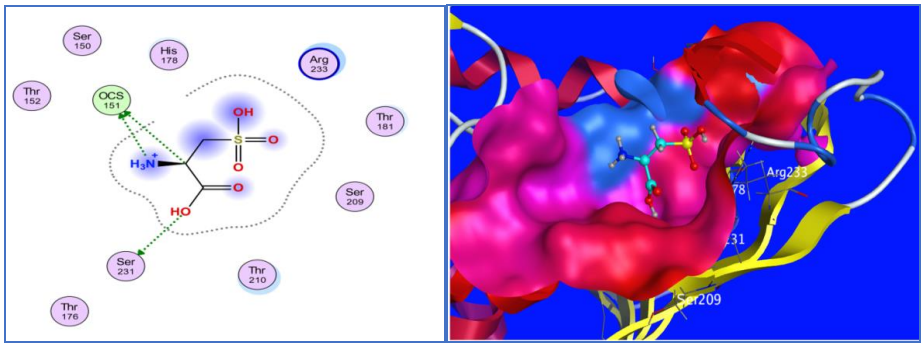
Table 2. Scores of the affinity results of modified for crotamiton and compound 1 related to the control

Bonds between Compound Atoms and 7U4S Active Site Residues									
Compound	**Score (kcal/mol)**	**RMSD (Å)**	**Compound atoms**	**Receptor atoms**	**Receptor residues**	**Interaction**	**d (Å)**	**E (kcal/mol)**	**Total E (kcal/mol)**
Compound 1	-6.8230	1.95	O 46 O 50 6-ring	OG1 N N	THR 210 (A) THR 181 (A) GLY 211 (A)	H-acceptor H-acceptor pi-H	3.13 3.20 4.07	-0.6 -1.1 -0.7	-37.9739
OCS reference	-4.2293	1.63	C 7 O 10 N 12	OD3 OG OD3	OCS 151 (A) SER 231 (A) OCS 151 (A)	H-donor H-donor H-donor	3.16 3.16 3.11	-1.9 -1.5 -1.3	-13.3336
Crotamiton	-5.10528	1.43	O 19 6-ring	NZ N	LYS 56 (A) SER 289 (B)	H-acceptor pi-H	3.17 4.02	-1.1 -1.1	-20.6350

Compound



OCS reference



Crotamiton

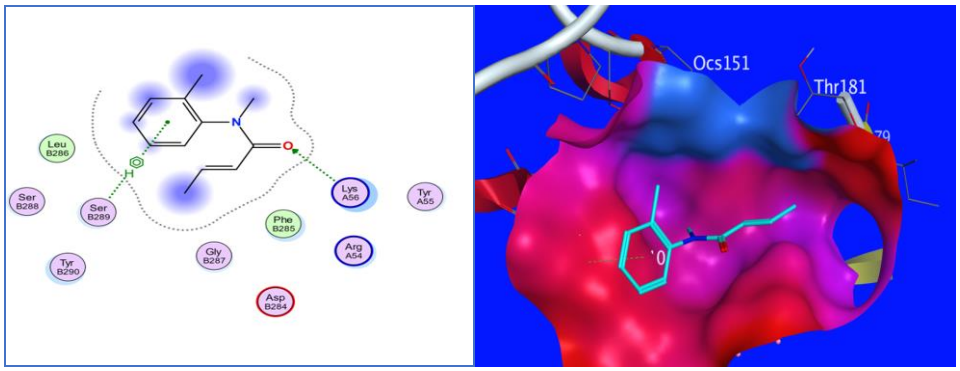


Figure 1. Superimposed docking score of modified for crotamiton (compound 1, compound 2, and compound 3) and OCS in the predicted active site of 7U4S.

Table 3. Explain the anti-fungi activity of synthesis compounds

Antifungal analysis (Zone of inhibition (mm))						
Sample		**A**	**B**	**C**	**D**	**E**
Candida	CY-CL	6	6	6	6	6
Candida	CY-BE	6	6	6	6	6
Candida	CY-BR	6	6	6	6	6
Candida	CY-4NO_2	6	6	6	6	6
Candida	CY-F	6	6	6	6	9
Candida	Crotamiton	6	11	12	13	14

Table 4. The antibacterial activity of compounds

Antibacterial analysis (Zone of inhibition (mm))						
Sample		**A**	**B**	**C**	**D**	**E**
S.aureus	Cy-Cl	6	22	24	27	28
E. coli		6	11	16	18	20
S.aureus	Cy-Be	6	22	28	30	32
E. coli		6	10	13	16	19
S.aureus	Cy-Br	6	21	27	29	30
E. coli		6	9	12	14	17
S.aureus	Cy-4NO_2	6	22	24	27	28
E. coli		6	11	16	19	20
S.aureus	Cy-F	6	23	25	26	29
E. coli		6	10	15	18	19
S.aureus	Crotamiton	6	18	20	23	24
E. coli		6	12	13	14	15

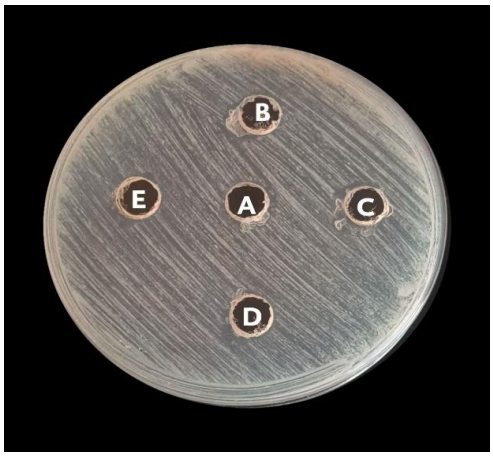


Figure 2. Antifungal activity of (Cy-Cl) against *Candida albicans:* A) Control, B) 12.5 µg/mL, C) 25 µg/mL, D) 50 µg/mL, and E) 100 µg/mL.

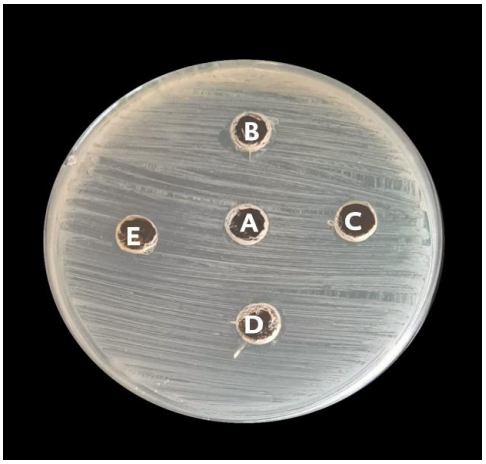


Figure 3. Antifungal activity of (Cy-Be) against *Candida albicans:* A) Control, B) 12.5 µg/mL, C) 25 µg/mL, D) 50 µg/mL, and E) 100 µg/mL.

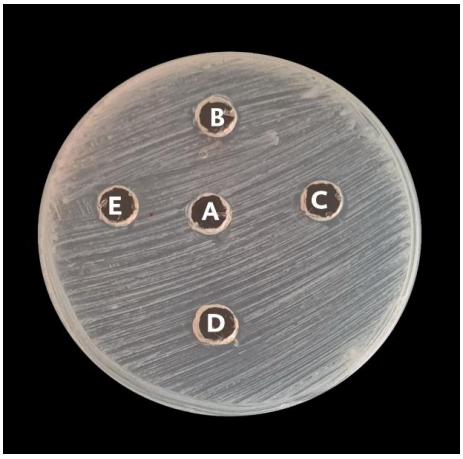


Figure 4. Antifungal activity of (Cy-Br) against *Candida albicans:* A) Control, B) 12.5 µg/mL, C) 25 µg/mL, D) 50 µg/mL, and E) 100 µg/mL.

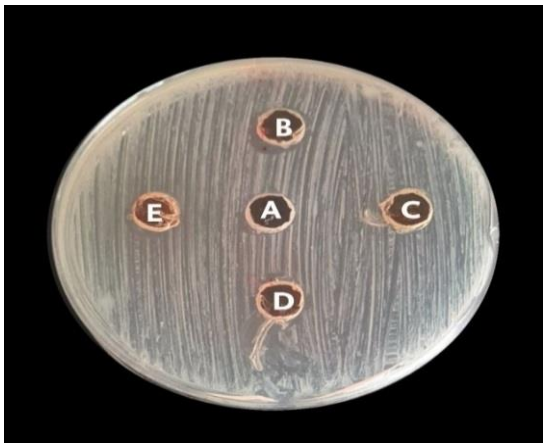


Figure 5. Antifungal activity of (Cy-4-NO_2) against *Candida albicans:* A) Control, B) 12.5 µg/mL, C) 25 µg/mL, D) 50 µg/mL, and E) 100 µg/mL.

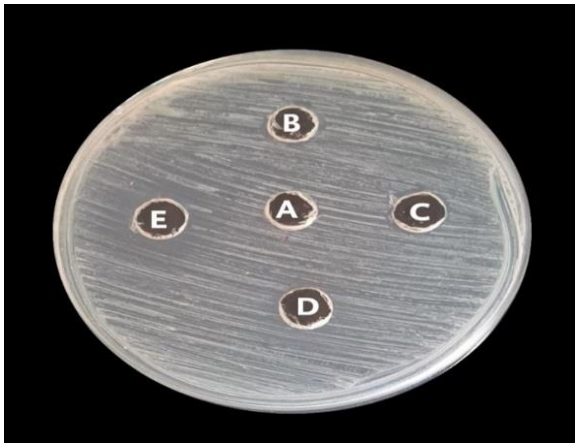


Figure 6. Antifungal activity of (Cy-F) against *Candida albicans:* A) Control, B) 12.5 µg/mL, C) 25 µg/mL, D) 50 µg/mL, and E) 100 µg/mL.

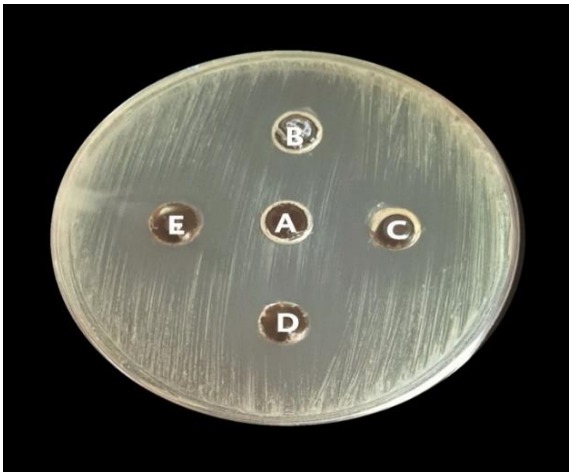


Figure 7. Antifungal activity of (crotamiton) against *Candida albicans:* A) Control, B) 12.5 µg/mL, C) 25 µg/mL, D) 50 µg/mL, and E) 100 µg/mL.

Statistical analysis

The data was examined statistically using the Graphpad prism tool. Data is shown as the mean ± SD of three experiments. Indicate a statistically significant difference at $p<0.05$.

Anti-fungi activity result

All results of antibacterial activity with various concentrations are displayed in the Figures 2-7, with all details described in Table 3.

Antibacterial activity

The antibacterial potential of the created materials (CY-CL, CY-F, CY-4NO_2, CY-BE, CY-BR, and crotamiton) was assessed against gram-negative and gram-positive bacterial strains utilizing an agar well dissemination measure [24,25]. Around 20 mL of Muller-Hinton agar was aseptically poured onto sterile Petri plates. Bacterial species were collected from their stock societies employing a sterile wire circle [26]. After refined the living beings, 6 mm-diameter wells were penetrated on the agar plates employing a sterile tip, into the bored wells, changing concentrations of the tests (CY-CL, CY-F, CY-4NO2, CY-BE, CY-BR, and crotamiton were utilized). The developed plates containing the Tests (CY-CL, CY-F, CY-4NO_2, CY-BE, CY-BR, and crotamioton) and the test life forms were brooded overnight at 37 °C sometime recently measuring and recording the normal the zones of restraint diameter [27,28].

Statistical analysis

Data were statically analyzed using Graphpad prism program [29]. Data are represented as mean ± SD of three experiments. Indicate statistically significant difference at $p<0.05$ [30,31].

Antibacterial activity result

In the recently synthesized chemicals, particularly **Cyb** appeared critical antibacterial movement against germs, comparable to routine medication, agreeing to examine their antibacterial potential. The inhibition zone (measured in mm) was assessed at different concentrations (12.5 µg/mL, 25 µg/mL, 50 µg/mL, and 100 µg/mL) for the chemicals: Cy-Cl, Cy-Be, Cy-Br, Cy-4-NO_2, Cy-F, and crotamiton. The results showed varying levels of antibacterial efficacy, with Cy-Be showing the strongest activity against *S. aureus*, while Cy-Cl demonstrated significant activity against both bacteria. All results of antibacterial activity with various concentrations are displayed in Figures 8-17 and Table **4**.

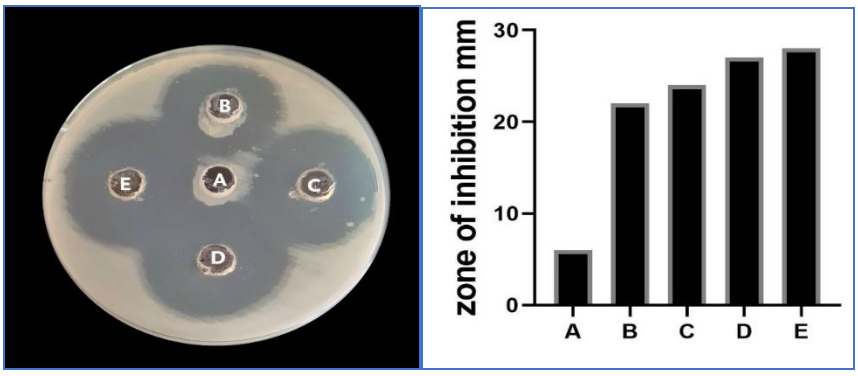


Figure 8. Antibacterial activity of (Cy-Cl) against *Staphylococcus aureus:* A) Control, B) 12.5 µg/mL, C) 25 µg/mL, D) 50 µg/mL, and E) 100 µg/mL.

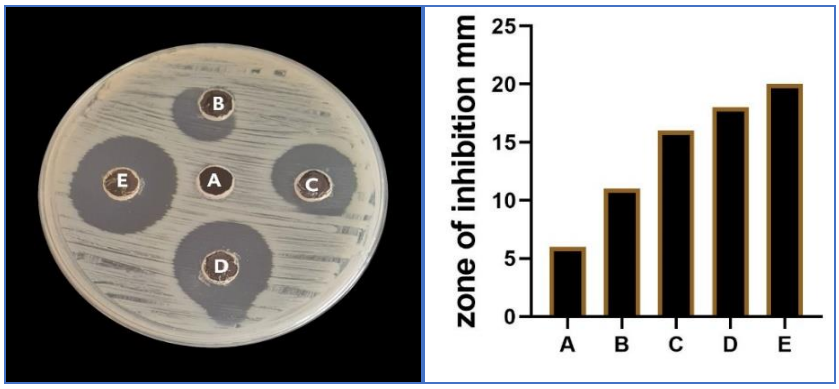


Figure 9. Antibacterial activity of (Cy-Cl) against *Ecoli:* A) Control, B) 12.5 µg/mL, C) 25 µg/mL, D) 50 µg/mL, and E) 100 µg/mL.

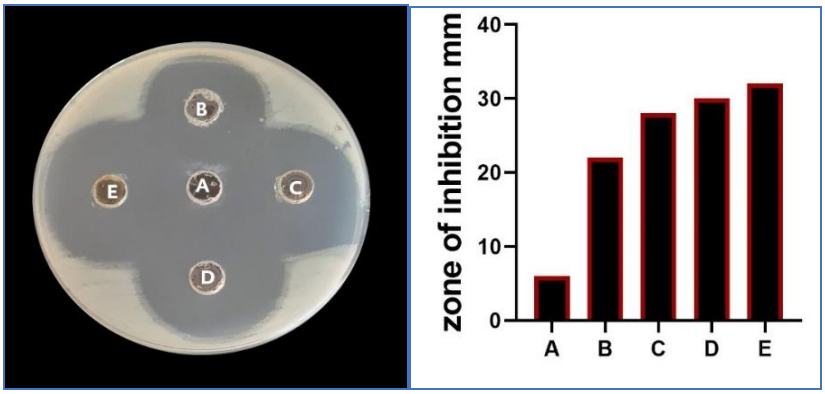


Figure 10. Antibacterial activity of (Cy-Be) against *Staphylococcus aureus:* A) Control, B) 12.5 µg/mL, C) 25 µg/mL, D) 50 µg/mL, and E) 100 µg/mL.

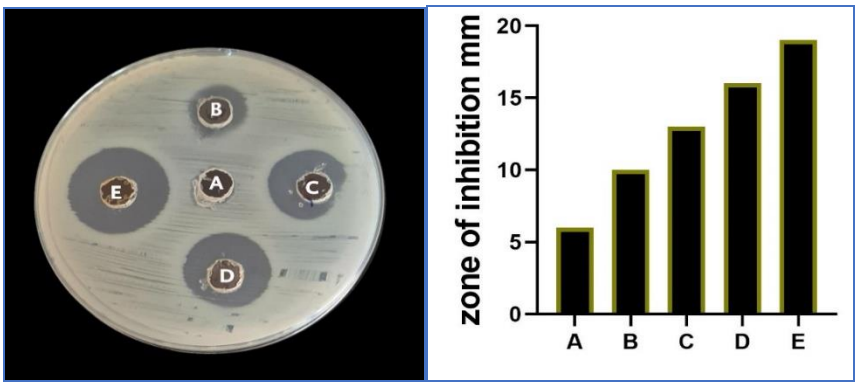


Figure 11. Antibacterial activity of (Cy-Be) against *E. coli:* A) Control, B) 12.5 µg/mL, C) 25 µg/mL, D) 50 µg/mL, and E) 100 µg/mL.

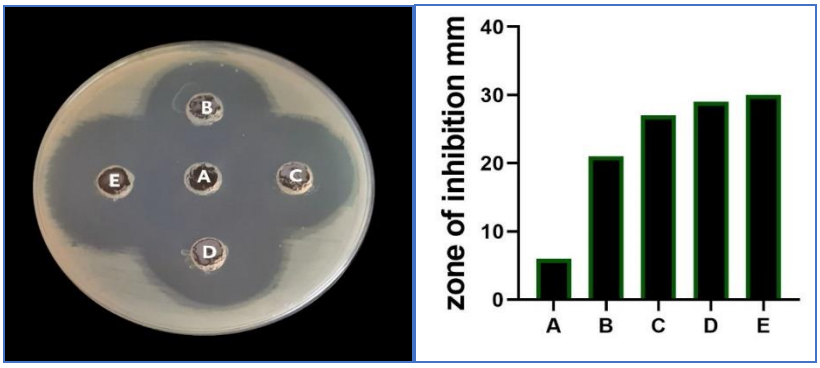


Figure 12. Antibacterial activity of (Cy-Br) against *Staphylococcus aureus:* A) Control, B) 12.5 µg/mL, C) 25 µg/mL, D) 50 µg/mL, and E) 100 µg/mL.

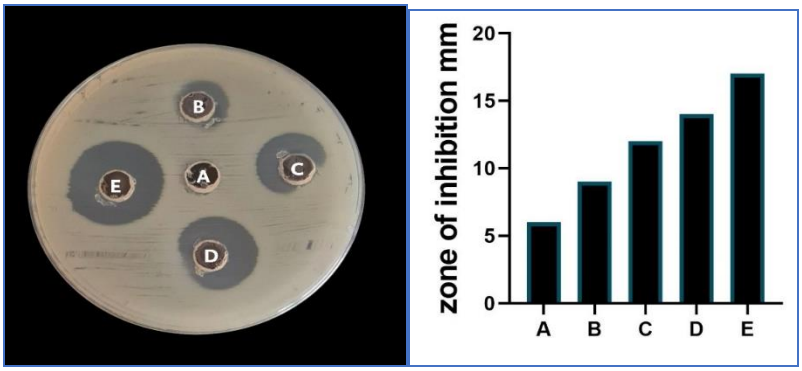


Figure 13. Antibacterial activity of (Cy-Br) against *E. coli:* A) Control, B) 12.5 µg/mL, C) 25 µg/mL, D) 50 µg/mL, and E) 100 µg/mL.

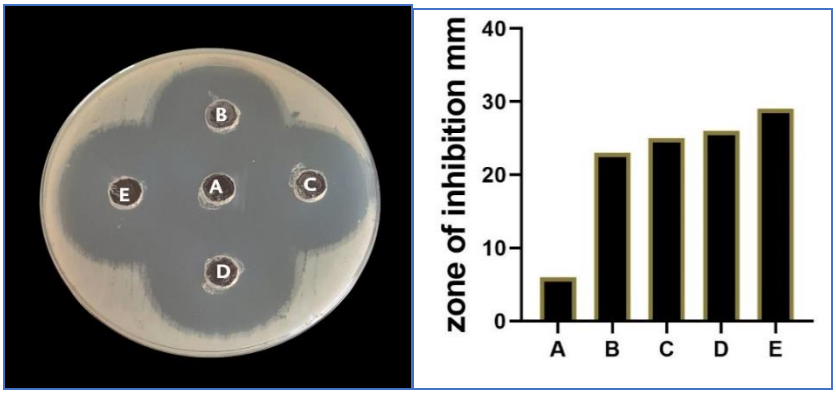


Figure 14. Antibacterial activity of (CY-F) against *Staphylococcus aureus:* A) Control, B) 12.5 µg/mL, C) 25 µg/mL, D) 50 µg/mL, and E) 100 µg/mL.

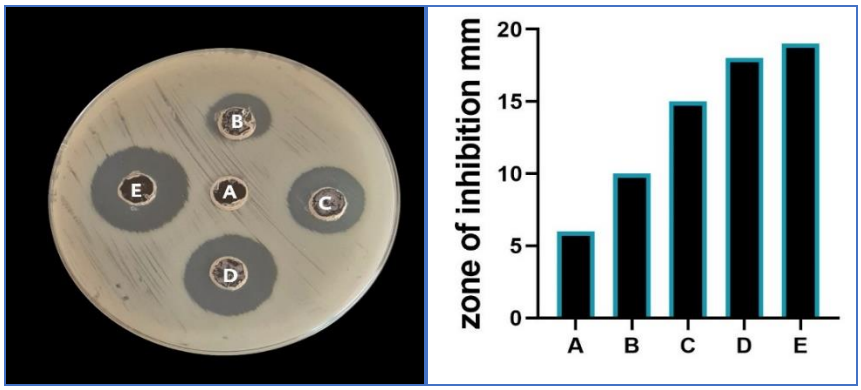


Figure 15. Antibacterial activity of (Cy-F) against *E. coli:* A) Control, B) 12.5 µg/mL, C) 25 µg/mL, D) 50 µg/mL, E) 100 µg/mL.

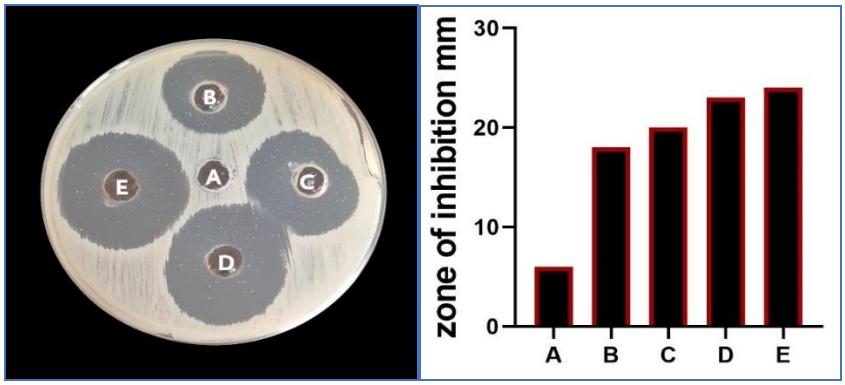


Figure 16. Antibacterial activity of (crotamiton) against *Staphylococcus aureus:* A) Control, B) 12.5 %, C) 25 %, D) 50 %, and E) 100 %.

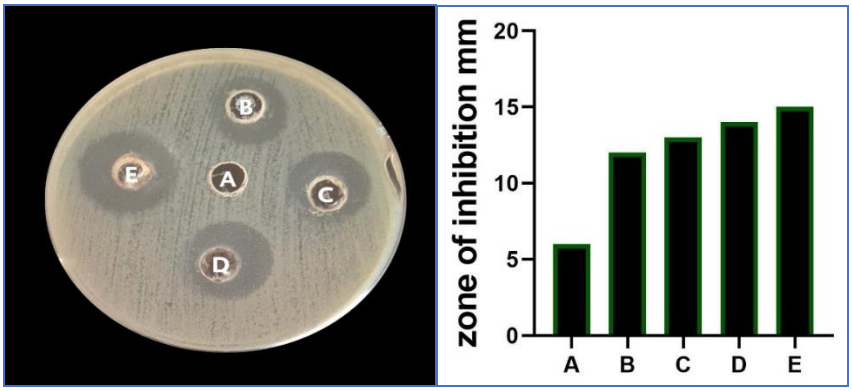


Figure 17. Antibacterial activity of (crotamiton) against *E. coli:* A) Control, B) 12.5 %, C) 25 % D) 50 %, and E) 100 %.

Conclusion

This work covers the blend of five pyrimidine subordinates' chemicals created from crotamiton. TLC, FT-IR, UV, MASS, and NMR spectroscopy were connected to characterize and recognize modern atoms. Atomic docking tests were done against the target. *In vitro* examinations uncover that crotamiton compound (lead chemical) could be a potentially helpful choice for treating contaminations with *Candida albicands* compared with pyrimidine subsidiaries of crotamiton. The early examination of antibacterial viability found that certain chemicals had more grounded antibacterial activity than crotamton. The nearness of heteroatoms (Pyrimidine moeity) within the compound structure causes harm to the cell divider and ruins to work.

Orcid

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