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Title of the Thesis: Synthesis of Novel Organic Compound and their Application as Biocidal Agents.

Abstract

The present research work deals with the synthesis, characterization and *in vitro* antibacterial activity of novel heterocyclic compounds. The present thesis comprises of five chapters.

Chapter-1 First chapter comprises of general introduction including literature of the work done in the area of microbial infections and defines the objective of the investigation.

Chapter-2 Deals with the synthesis, characterization and antibacterial assay of **(E)-3-(benzo[d][1,3]dioxol-6-yl)-1-substitutedphenylprop-2-en-1-one (1a-1e)** derivatives. Further these chalcone derivatives were cyclised into six and five membered heterocyclic rings such as **4-(benzo[d][1,3]dioxol-6-yl)-6-substitutedphenyl-6H-1,3-oxazin-2-amine derivatives (2a-2e), 4-(benzo[d][1,3]dioxol-6-yl)-6-substitutedphenyl-6H-1,3-thiazin-2-amine derivatives (3a-3e)** and **5-(benzo[d][1,3]dioxol-6-yl)-4,5-dihydro-3-ubstitutedphenyl-1H-pyrazole derivatives (4a-4e).** All compounds were synthesized with an aim to explore their effect on *in vitro* growth of S. *aureus, S. epidermidis, E. coli* and *P. mirabilis* bacterial strains. It was found that out of all the synthesized compound 5-(benzo[d][1,3]dioxol-6-yl)-4,5-dihydro-3-ubstitutedphenyl-1H-pyrazole derivatives **(4a-4e)** showed better inhibitory effects than other six membered heterocyclic derivatives. The best antibacterial activity was observed for **4c** and **4d** against *S. epidermidis* and *E. coli* which are almost equivalent to standard drug "Amoxicillin".

Chapter-3 Describes synthesis, characterization and antibacterial activity of **substituted-1,3,5-triazine-2,4-diyl di/bisbenzene/substituted benzene sulfonamides (10-24)**

derivatives. These compounds were screened for their *in vitro* antibacterial activity against *S. aureus, S. epidermidis, P. mirabilis, E. coli and K. pneumoniae*. Result of bioassay indicated that the compounds **13, 20, 21, 22** and **23** showed best activity among the series, which are almost equivalent to reference drug 'Amoxicillin'.

Chapter-4 Describes synthesis and characterization of ***N-[(E)-substituted/unsubstituted benzylideneamino]-2-[5-[1-[2-[2-[(2E)-2-substituted/unsubstitutedbenzylidene hydrazino]-2-oxo-ethyl] tetrazol-5-yl]-2-phenyl-vinyl]tetrazol-2-yl]acetamide (5-19)*** and evaluation of their antibacterial activity against S. *aureus, S. epidermidis, E. coli, P. mirabilis* and *K. pneumoniae* bacterial strains. It was observed that the activity of these compounds depend on the optimum electron density which is maintained by the different substituents present on the phenyl ring. Out of the fifteen derivatives of acyl-hydrazone of tetrazole compounds **6, 7, 9, 18** and **19** showed encouraging results, out of which compound **(9)** showed better antibacterial activity. Other compounds appeared as broad spectrum, they showed mild to moderate effect against all the bacterial strains such as *S. aureus, S. epidermidis, P. mirabilis* and *E. coli*. It was also noted that, these compounds showed better activity against Gram-positive bacterial strains in comparison to Gram-negative bacterial strains.

Chapter-5 Describes synthesis, characterization of **substituted thiazolidinones (19-27)** derivatives and evaluation of their antibacterial activity. These compounds were screened for *in vitro* antibacterial activity against *S. aureus, S. epidermidis, P. mirabilis, E. coli* and *K. pneumoniae*. Antibacterial assay revealed that the synthetic compounds are effective against growth of tested organisms. Out of all the tested compounds **18, 19, 21** and **25** showed significant activity against all the strains. Compound **19** and **25** showed promising results against *P. mirbilis and E. coli*, which was equivalent to the "Amoxicillin". It was also noted that thiazolidinone ring showed better activity than their parent chalcones and thiosemicarbazones derivatives.