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Chapter 6

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This research included with simple easily executed convenient method for synthesis of different azo congeners. All the newly synthesized azo molecules are successfully characterized by modern analytical techniques. Most of the novel synthesized azo molecules showed good antimicrobial activities against a wide range of bacterial and fungal strains. The compounds 4-[(4-hydroxy-2-oxo-2H-chromen-3-yl) diazenyl]-1, 5-dimethyl-2-phenyl-1H-pyrazol-3(2H)-one (4e) and 4-hydroxy-3-((3-nitrophenyl) diazenyl)-2H-chromen-2-one (4iv) belong to scheme-1 showed excellent antimicrobial activities against a wide range of microbial strains whereas the compound 2-[(8-hydroxyquinolin-5-yl) diazenyl] benzoic acid (4h) belongs to scheme-2 showed excellent antibacterial activities in comparison to standard (Ampicillin). In scheme-3 the salicylic acid congener ((4-bromo-3-methylphenyl)diazenyl)-2-hydroxybenzoic acid (4e) and 2-hydroxy-5-((4-(N-(5-methylisoxazol-3-yl) sulfamoyl) phenyl) diazenyl) benzoic acid (4h) showed excellent antibacterial activities whereas the compound 5-((4-carboxyphenyl)diazenyl)-2-hydroxybenzoic acid (4g) and 2-hydroxy-5-((4-(N-(5-methylisoxazol-3-yl) sulfamoyl) phenyl) diazenyl) benzoic acid (4h) showed excellent antifungal activities against A. niger, T. rubrum and C. glabrata. In scheme-4, the compounds 4-((2, 4-dihydroxyphenyl) diazenyl) benzoic acid (4c) and 4-((2, 4-dihydroxyphenyl) diazenyl)-1, 5-dimethyl-2-phenyl-1H-pyrazol-3(2H)-one (4e) showed excellent antibacterial activities whereas the compound 4-((2, 4-dihydroxyphenyl) diazenyl)-1, 5-dimethyl-2-phenyl-1H-pyrazol-3(2H)-one (4e) and 4-((2, 4-dihydroxyphenyl) diazenyl)-N-(5-methylisoxazol-3-yl) benzene sulfonamide (4f) showed excellent antifungal activities. The thiobarbituric acid conjugated newly synthesized azo molecules 5-[(4-bromo-3-methylphenyl) diazenyl]-2-
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thiobarbituric acid (4v), 5-[(3-nitrophenyl)diazenyl]-2-thiobarbituric acid (4ix) and 5-[(2-methylphenyl) diazenyl]-2-thiobarbituric acid (4xii) showed excellent antibacterial activities against majority of bacterial pathogens (scheme-5). The compound 4-((2-hydroxynaphthalen-1-yl) diazenyl) benzoic acid (4h) from scheme-6 showed excellent antibacterial activities against different Gram positive and Gram negative bacterial strains. The compound 4-((2-hydroxynaphthalen-1-yl) diazenyl)-1, 5-dimethyl-2-phenyl-1H-pyrazol-3(2H)-one (4g) showed excellent significant antifungal activities against A. niger, T. rubrum and C. glabrata whereas its Ni$^{++}$ complex showed significant antifungal activities against T. rubrum and C. Glabrata. Comparing the results of antifungal activities of the metal complexes it was found that the Ni$^{++}$ complex of 4-((2-hydroxynaphthalen-1-yl) diazenyl)-1, 5-dimethyl-2-phenyl-1H-pyrazol-3(2H)-one (4g) showed excellent antifungal activities against T. rubrum and C. Glabrata.

In scheme-7 the compounds 2-hydroxy-5-((3-nitrophenyl) diazenyl) benzaldehyde (4d) and 5-((4-bromo-3-methylphenyl) diazenyl)-2-hydroxybenzaldehyde (4e) showed highly potent antibacterial activities against both Gram positive & Gram negative bacterial strains. The complexes of 2-hydroxy-5-((3-nitrophenyl) diazenyl) benzaldehyde (4d) possess good antifungal activities against T. rubrum and C. glabrata.

The compound 5, 5’-(1E)-4, 4’-sulfonyl bis (4, 1-phenylene) bis (diazone-2, 1-diyl) diquinolin-8-ol (4b) belongs to scheme-8 showed excellent antimicrobial activities against a wide range of microbial strains.

Overall, the 5-methyl isoxazolyl heterocyclic nucleus, 2-carboxy phenylazo, 4-carboxy phenylazo, 4-antipyrinylazo and 3-nitro phenylazo conjugated ligands mostly showed broad spectrum antimicrobial activities. Corroborate to the findings of antimicrobial activities by different novel synthetic azo analogues under different schemes, it was observed that the 5-heteroaryl/arylazo 8-hydroxy quinoline (8-HQ) congeners (scheme-2) showed best
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antibacterial activities than the azo molecules synthesized in other schemes. However the heterocyclic nucleus containing azo congeners in most of the schemes showed significant biological activities. The newly synthesized azo molecules showed tremendous zone of inhibitions against *S. enterica* ser. *typhi*, *P. aeruginosa*, *S. flexneri*, *S. mitis*, *K. pneumonia* and *S. aureus*. The results of antioxidant activities observed by the different azo analogues revealed that the 4-antipyrinyl azo, 2-carboxy phenylazo, 4-carboxy phenylazo and 3-nitrophenyl azo conjugated ligands in different schemes showed significant antioxidant activities.

The novel synthesized azo molecules may be suggested for the establishment of new search for antimicrobial agents and to create an opportunity in new drug discovery and medicinal research.