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Review Article

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BIOLOGICAL IMPORTANCE OF TRIAZOLE DERIVATIVES

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ABSTRACT

Heterocyclic compounds especially triazole derivatives play a very important role in pharmacological fields such as antimicrobial, anticonvulsant, analgesic insecticidal, anticancer, activities. Many researchers and scientists have synthesized triazole derivatives and discussed various biological activities. On the basis of above observation, researchses has foccus on synthetic plan of triazole derivatives and evaluation their biological activity.

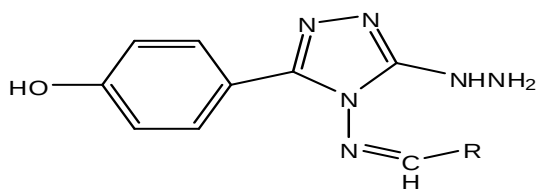
KEYWORDS: Triazoles, biological activity, antimicrobial, anti-inflammatory, anticancer activity.

INTRODUCTION

Chemical formula of triazole is $C_2H_3N_3$. It is five membered rings which contain two carbon and three nitrogen atoms. A special class of heterocyclic compounds of triazole possesses wide range of biological properties. From the earlier study, it is revealed that triazole nucleus possesses different pharmacological properties such as anticonvulsant[1-2], antimicrobial[3-10], anticancer[11-13], antituberculosis[14], antibacterial[15-19], antifungal[20-23], anti-inflammatory[24-27], antioxidant[28] activity etc. Some common drugs such as fluconazole, terconazole, nefazodone, rizatripton, etoperidone, posaconazole, anastrozole etc. are the example of standard drugs which contain triazole nucleus. This review article focused the work on triazoles that explained biological activity reported by many scientists in field of chemistry.

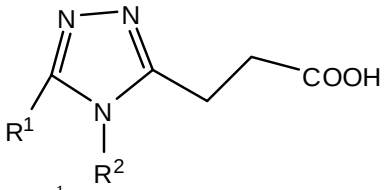
BIOLOGICAL ASPECTS OF TRIAZOLES

Synthesis, characterization and biological activity of some novel triazole derivatives have been synthesized by Arora et al.[29] and screened for antimicrobial activity. Antibacterial activity evaluated against E. coli, B. pseudomonas aeruginosa, C. bacillus subtili, D. staphylococcus aureus and compared with ciprofloxacin. These compounds also showed antifungal activity against A. niger.



R = Benzaldehyde, salicylaldehyde, anisaldehyde, p-hydroxybenzaldehyde, m-nitrobenzaldehyde, p-dimethylaminobenzaldehyde, formaldehyde.

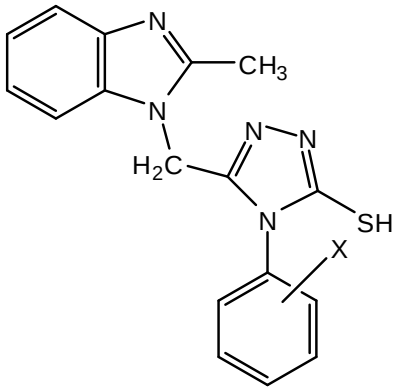
Paprocka et al.[30] have synthesized new1,2,4-triazole derivatives containing propionic acid moiety and evaluated biological activity of these compounds such as antimicrobial, anthelmentic and anti-inflammatory activity.



R^1 = 2-pyridyl, 4-pyridyl, Ph

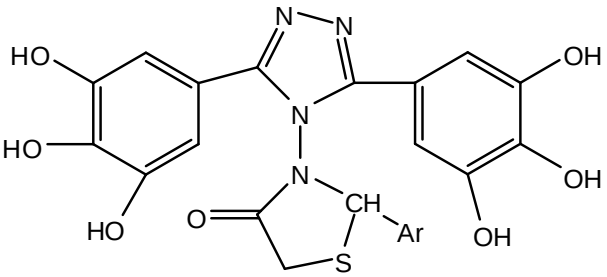
R^2 = 2-pyridyl, Ph, 4-$PhCH_3$, $4PhNO_2$

Ansari et al.[31] have prepared synthesis and biological activity of some triazole bearig benzimidazole derivatives and screened for antimicrobial activity against different bacteria and fungi then compared by standard drugs ampicilline and ampholiricin B.



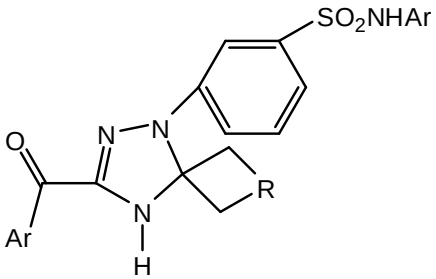
X = 2-CH_3, 2-C_2H_5, 2-C_3H_7, 2-OH, 4-OH, 4-OCH_3, 2-Cl, 4-Cl, 4-NH_2

F.A. Nashaan and M.S. Al-Rawi[32] have synthesized Design, synthesis and biological activity of new thiazolidine-4-one derived from symmetrical 4-amino 1,2,4-triazole.



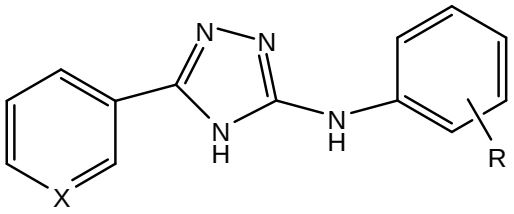
Ar= C_6H_5, 4-OH & 3,5-$OCH_3C_6H_2$

Dalloul et. al.[33] have synthesized spiro1,2,4-triazole derivatives and showed antimicrobial activity against various bacteria E. coli, S. aureus, K. Protius then compared with tetracycline and various fungi C. albicans, A. niger then compared with fluconazole.



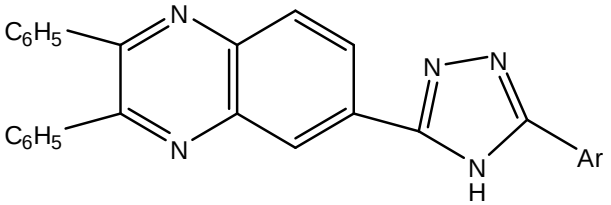
Ar'/R = (a) 2-thiazolyl / $(CH_2)_2$, (b) 2-pyrimidinyl/ $(CH_2)_2$, (c) thiazolyl / $(CH_2)_3$, (d) 2-pyrimidinyl/(CH_3), (e) 2-thiazolyl/$(CH_2)_4$, (f) 2-pyrimidinyl/$(CH_2)_5$, (g) 2-thiazolyl $CH_2CHMeCH_2$, (H) 2-pyrimidinyl/$CH_2CHMeCH_2$, (i) 2-thiazolyl/CH_2CH(t-bu)CH_2, (j) 2-pyrimidinyl/CH_2CH(t-bu)CH_2
Ar = CH_3, C_2H_5, 2-furyl, 2-thianyl, 2-Naphthyl

Synthesis and biological evaluation of 3-amino-1,2,4-triazole derivatives as potential anticancer compounds have been synthesized by Grytsai et al.[34]



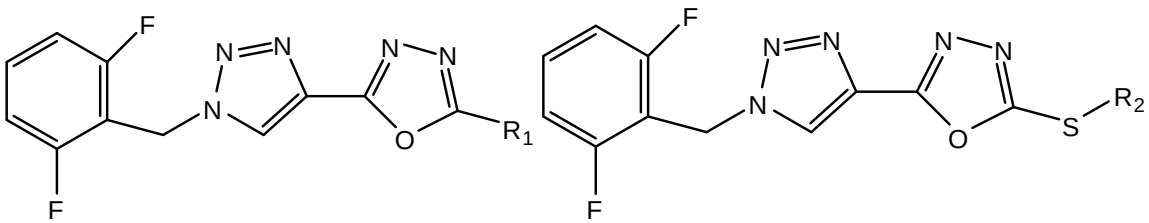
R = H, 2-CH_3, 2-OH, 2-OC_2H_5, 2-NO_2, 2-Cl, 2-Br, 3-NO_2, 3-Br, 4-CH_3, 4-Cl, 2,5-diCl, 3,4-diCl, 3,4-di(CH_3), 2-OH-5-CH_3, 2-OH-6-CH_3, 2-OH-4-NO_2, 2-OH-4-Cl, 2-OMe-5-NO_2, 2-Cl-5-NO_2, 2,4-diCl

Synthesis and biological evaluation of some novel quinoxalinyl triazole derivatives have been prepared by Mazumder et al.[35] They showed antifungal activity against C. albicans and A. niger then compared with fluconazole.



Ar = C_6H_5, 3-$NO_2C_6H_4$, 3-$OCH_3C_6H_4$, 3-OCH_3&4-OHC_6H_3, 4-FC_6H_4, 4-ClC_6H_4, 2-ClC_6H_4, 4-$OCH_3C_6H_4$, 2,4-$Cl_2C_6H_3$, 3,4,5$(OCH_3)C_6H_2$

Jadhav et al.[36] have prepared 1,4-disubstituted 1,2,3-triazole derivatives and evaluated biological activity as antimicrobial agents. Antibacterial activity screened against different bacteria such as E. coli, P. aeruginosa, B. subtilis, S. pyogenes, K. pneumonia, S. aureus, K. terrigena and compared by chloramphenicol. Antifungal activity evaluated against various fungi such as C. albicans, T. viride, A. flavus, A. brasilience and compared by nystatin.



R_1 = Phenyl, 2-tolyl, 3-chlorophenyl, 4-chlorophenyl, 4-fluorophenyl, 2 & 4-dichlorophenyl, 3 & 4-dimethoxyphenyl
R_2 = Ethyl, isopropyl, n-butyl, isopentyl, benzyl

CONCLUSON

Triazole nucleus is a part of heterocyclic compounds which plays an important role in preparation of drugs. In this review, we focused on biological importance of triazole derivatives such as anti-inflammatory, anticonvulsant, antibacterial, antimicrobial, anticancer ctivities etc. The potential power triazole derivatives in field of pharmacological property, we can plan for the synthesis and evaluation of new drugs of triazole derivatives by possessing of possible substituent.

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