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Role of 1,3,4-oxadiazole Derivatives in Pharmaceutical Chemistry

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Editorial

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Oxadiazole is a important heterocyclic compound in pharmaceutical chemistry which is composed of one oxygen and two nitrogen atoms in five membered ring. It is obtained from furan by the replacement of two methane (-CH=) group by two pyridine type nitrogen (-N=), which may classified into four isomers based on the position of N- atom in the heterocyclic ring : 1,2,3-oxadiazole, 1,2,4-oxadiazole, 1,2,5-oxadiazole and 1,3,4-oxadiazole [1]. Among heterocyclic compounds, 1,3,4-oxadiazole scaffold and its derivatives has become an important construction motif for the development of novel drugs.

It is an important heterocyclic nucleus which has attracted a wide attention of the medicinal chemists in search for NCEs (new chemical entities) in this field. Out of its possible isomers; 1,3,4-oxadiazole is widely exploited for various applications in medicinal chemistry. This interesting group of compounds has diverse biological activities such as antibacterial, antifungal, antiviral, anticonvulsant, pesticidal, antimycobacterial and anticancer activities etc.

Depending upon the most recent literature survey revealed that a minor modification in the structure of the compounds can result in qualitative as well as quantitative changes in the improved biological activity and lesser toxicity. Some newer 1,3,4-oxadiazole containing compounds have broad spectrum of pharmacological activities reported in the literature over the past years.

There are several methods are used for the synthesis of 1,3,4-oxadiazole derivatives which includes these synthetic routes making use only of new reaction conditions such as: new cyclization reagents, new catalysts, polymeric supports and microwave radiation, cyclodehydration reactions of diacylhydrazines, cyclization oxidative reactions of N-acylhydrazones, one-step synthesis from readily available carboxylic acids and acid hydrazides, reactions of hydrazides with orthoesters, hydrazide reactions with carbon disulfide in basic medium, reaction of tetrazoles with acid chloride or acid anhydride etc. reported in the literature [2].

Several compounds containing 1,3,4-oxadiazole nucleus have a broad range of biological importance in the medicinal chemistry such as analgesic-anti-inflammatory activity with reduced ulcerogenic toxicities [3], antimicrobial [4-6], pesticidal, antimycobacterial, andantitumor [7,8] reported in the literature. It is an important pharmacophore which play a major role in the medicinal chemistry, therefore it can be concluded that 1,3,4-oxadiazole containing derivatives may be used for the new drug design and development of novel drugs to provide better treatment for various fatal diseases like inflammatory, viral, microbial, epilepsy and cancer diseases.

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