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NOTE

Synthesis and Antibacterial Activity of Some Benzothiazole Derivatives of S-triazine

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In the present work, authors report the synthesis and antibacterial activity of some benzothiazole derivatives of S-triazine.

A survey of literature reveals that S-triazine, phenyl urea and thiazole derivatives possess a broad spectrum of biological importance. S-triazine and its derivatives have been found to be effective as antitubercular, diuretic[1], antiprotozoal antihistaminic, antimalarial[2], insecticidal, fungicidal[3] and antiviral. Similarly, phenyl urea is used as disinfectant and veterinary medicine[4], antibacterial[5] and antispasmodic. The thiazole derivatives have been reported as bacteriostatic[6] and fungisidic[7]. The aim of the present work is to combine all the above mentioned bacteriostatic compounds and to screen their bactericidal activity against two important groups of bacteria, *viz.*, *E. coli* representing gram –ve group and *S. aureus* of gram +ve group. After synthesizing the compounds their physico-chemical characterization has been carried out.

The syntheses of 2-(6′-chlorobenzothiazol-2′-yl-amino)-4-(3′-methylanilino)-phenyl ureido-S-triazine derivatives were carried out by first condensing 2-amino-6-chlorobenzothiazole with cyanuric chloride; this was condensed with *m*-toluidine and finally refluxed with various aryl ureas to obtain corrsponding S-triazine derivatives mentioned in Table-1. The compounds were then screened for their antibacterial activity against two important genera of bacteria representing gram –ve group and gram +ve group (Tsble-1).

Table-1 shows the antibacterial activity of the compounds along with their chemical and physical characteristics. IR-spectra of the compounds show C_3N_3 stretching vibrations at 820–800 cm^{-1}, secondary amines —NH bending vibrations at 1540 cm^{-1}, substituted urea C=O stretching vibrations at 1615–1600 cm^{-1} and conjugative cyclic C=N stretching vibrations at 1670 cm^{-1}.

The control drugs ampicillin (10 μg/mL) and streptomycin (5 μg/mL) show 24.00 and 20.00 mm respectively against *E. coli* and 28.00 and 16.00 against *S. aureus* respectively which is according to NCCLS standard[8]. The maximum

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activity was recorded with 2-(6′-chlorobenzothiazol-2′-yl-amino)-4-(3′-methylanilino)-6-phenyl ureido-S-triazine and 2-(6′-chlorobenzothiazol-2′-yl-amino)-4-(3′-methylanilino)-6-(2′-methoxyphenyl ureido)-S-triazine compounds against *E. coli* (11.00 mm) and *S. aureus* (9.00 mm).

TABLE-1
CHARACTERIZATION AND ANTIBACTERIAL DATA OF COMPOUNDS

Compound	m.f.	m.p. (°C)	N (%)	Zone size in mm	
				E. coli	*S. aureus*
2-(6′-Chlorobenzothiazol-2′-yl-amino)-4-(3′-methyl anilino)-6-(phenyl ureido)-S-triazine	$C_{24}H_{19}ON_8SCl$	150	22.27	11.0	9.0
2-(6′-Chlorobenzothiazol-2′-yl-amino)-4-(3′-methyl anilino)-6-(3′-nitro PU)-S-triazine	$C_{24}H_{18}O_3N_9SCl$	175	22.95	8.0	8.5
2-(6′-Chlorobenzothiazol-2′-yl-amino)-4-(3′-methyl anilino)-6-(4′-nitro PU)-S-triazine	$C_{24}H_{18}O_3N_9SCl$	185	22.95	8.0	8.5
2-(6′-Chlorobenzothiazol-2′-yl-amino)-4-(3′-methyl anilino)-6-(2′-methyl PU)-S-triazine	$C_{25}H_{21}ON_8SCl$	171	21.63	10.0	6.0
2-(6′-Chlorobenzothiazol-2′-yl-amino)-4-(3′-methyl anilino)-6-(3′-methyl PU)-S-triazine	$C_{25}H_{21}ON_8SCl$	179	21.60	10.0	7.0
2-(6′-Chlorobenzothiazol-2′-yl-amino)-4-(3′-methyl anilino)-6-(4′-methyl PU)-S-triazine	$C_{25}H_{21}ON_8SCl$	187	21.65	10.0	7.0
2-(6′-Chlorobenzothiazol-2′-yl-amino)-4-(3′-methyl anilino)-6-(2′-methoxy PU)-S-triazine	$C_{25}H_{21}O_2N_2SCl$	198	21.00	11.0	9.0
2-(6′-Chlorobenzothiazol-2′-yl-amino)-4-(3′-methyl anilino)-6-(4′-methoxy PU)-S-triazine	$C_{25}H_{21}O_2N_2SCl$	148	20.99	6.0	6.5
2-(6′-Chlorobenzothiazol-2′-yl-amino)-4-(3′-methyl anilino)-6-(2′-chloro PU)-S-triazine	$C_{24}H_{18}ON_8SCl_2$	165	20.83	7.0	7.0
2-(6′-Chlorobenzothiazol-2′-yl-amino)-4-(3′-methyl anilino)-6-(3′-chloro PU)-S-triazine	$C_{24}H_{18}ON_8SCl_2$	137	20.85	8.0	8.5

Symbol: PU = phenyl ureido

It was found that methyl and methoxy substitution was effective as antibacterial agents. Both organisms show their effectiveness as therapeutic agents.

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