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NOTE

Synthesis and Antibacterial Activity of Some Carbamoylphenoxy Derivatives of S-Triazine

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2-(2′-Carbamoyl-phenoxy)-4-(3′-methyl anilino)-6-aryl-ureido compound has been condensed with S-triazine and substituted with nitro, methyl, methoxy and chloro groups at various positions in aryl ureido group and their antibacterial activity has been screened.

S-triazine and phenyl urea possess a wide spectrum of biological activity[1–5]. In the present study the compounds have been synthesized by condensing salicylamide cyanuric chloride, *m*-toluidine and nitro, methyl, methoxy and chloro ureas obtain more active compounds using known method. All the product complexes were screened *in vitro* for their antibacterial activity against the gram-positive *Staphylococcus aureus* and gram negative *E. coli* using 50 μg/mL concentration. It was found that all modified compounds were inhibitory to gram negative bacteria but not the other group, except 2′ and 4′ methyl phenyl ureido compounds.

A reaction solution containing salol 25 g and 25% ammonia (100 mL) were stirred for 16–20 h until the smell of ester disappeared. The solution was then acidified with 50% sulfuric acid. This salicylamide was used to synthesize carbamoyl-phenoxy triazine derivatives as shown in Table-1.

All the compounds (50 μg/mL) were screened for their antibacterial activity against *staphylococcus aureus* and *E. coli* which are gram positive cocci and gram –ve rods Respectively, using mueller-hinton agar as described by Kirby Bauer method[6]. Basic standard drugs were used as control[7], *viz.*, ampicillin and streptomycin.

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TABLE-1
SEQUENCIAL STEPS FOR THE SYNTHESIS OF CARBAMOYL PHENOXY COMPOUNDS

Step	Reactant (concentration)	Condition	Product	Purification
1.	Salicylamide + cynuric chloride (0.01 M) (0.01 M) (1.37 g) (1.84 g)	Stirred in acetone at 0–5°C for 2 h at neutral pH	Comp. A*	Cooled, filtered, dried and crystallized from absol. alcohol
2.	Compound A + *m*-toluidine (0.01 M) (0.01 M) (2.35 g) (1.072 g)	Stirred in acetone at 35°C and neutral pH for 2 h allowing rising temperature up to 45°C in cold H_2O	Comp. B†	As above
3.	Compound B + phenyl urea (0.01 M) (0.01 M) (3.55 g) (1.36 g)	Refluxed in water bath at 80–90°C for 3 h at neutral pH	Comp. 1‡	As above
4.	Compound B[b] + corresponding phenyl urea (0.01 M) (0.01 M in dioxane) (3.55 g)	As above	Comp. 2 to 10‡	As above

*2-(2′-carbamoyl phenoxy)-4,6-dichlorotriazine
†2-(2′-carbamoyl phenoxy)-4-(2′-methyl anilino-6-chlorotriazine
‡Vide Table-2

Table-2 shows the chemical, physical and antibacterial data of the compounds, IR spectra of the compounds showed C_3N_3 stretching vibrationsat 810–800 cm^{-1}, secondary amines —NH bending vibrations at 1530–1520 cm^{-1}, —C—NH_2 bending vibrations at 1540 cm^{-1}, C—O—C stretching vibrations at 1250–1240 cm^{-1} and substituted ureas (C=O) stretching vibrations at 1600 cm^{-1}.

The control drugs ampicillin (10 μg/mL) and streptomycin (5 μg/mL) show 22.0 mm and 20.0 mm respectively against *E. coli* and 26.0 mm and 13.0 mm against *S. aureus* respectively which is according to NCCLS standard[7]. The maximum zone was recorded for 4′-methoxy group substituted compound against *E. coli*, while in case of *S. aureus* with 4′-methyl substituted compound. The screening results showed the possibility of these compounds as drugs.

TABLE-2
CHARACTERIZATION AND ANTIBACTERIAL DATA OF COMPOUNDS

Compound	Mol. formula	m.p. (°C)	N %	Antibacterial activity (*E. coli*)	zone (in mm) (*S. aureus*)
2-(2′-carbamoyl-phenoxy)-4-(3′-methyl anilino)-6-(phenylureido)-S. triazine	$C_{24}H_{21}O_3N_7$	155	21.49	12.0	6.0
2-(2′-carbamoyl-phenoxy)-4-(3′-methyl anilino)-6-(3′-nitro PU)-S. triazine	$C_{24}H_{20}O_5N_8$	167	22.35	8.5	6.0
2-(2′carbamoyl-phenoxy)-4-(3′-methyl anilino)-6-(4′-nitro PU)-S. triazine	$C_{24}H_{20}O_5N_8$	174	22.38	10.0	7.0
2-(2′-carbamoyl-phenoxy)-4-(3′-methyl anilino)-6-(2′-methyl PU)-S. triazine	$C_{25}H_{23}O_3N_7$	188	20.83	6.0	6.5
2-(2′-carbamoyl-phenoxy)-4-(3′-methyl anilino)-6-(3′-methyl PU)-S. triazine	$C_{25}H_{23}O_3N_7$	182	20.88	6.0	7.0
2-(2′-carbamoyl-phenoxy)-4-(3′-methyl anilino)-6-(4′-methyl PU)-S. triazine	$C_{25}H_{23}O_3N_7$	187	20.85	9.0	7.5
2-(2′-carbamoyl-phenoxy)-4-(3′-methyl anilino)-6-(2′-methoxy PU)-S. triazine	$C_{25}H_{23}O_4N_7$	147	20.16	11.0	7.0
2-(2′-carbamoyl-phenoxy)-4-(3′-methyl anilino)-6-(4′-methoxy PU)-S. triazine	$C_{25}H_{23}O_4N_7$	169	20.14	14.0	6.5
2-(2′-carbamoyl-phenoxy)-4-(3′-methyl anilino)-6-(2′-chloro PU)-S. triazine	$C_{24}H_{20}O_3N_7Cl$	167	19.99	14.0	6.0
2-(2′-carbamoyl-phenoxy)-4-(3′-methyl anilino)-6-(3′-chloro PU)-S. triazine	$C_{24}H_{20}O_3N_7Cl$	189	20.01	11.0	6.5

Symbol: PU = phenyl ureido

REFERENCES

1. D.N. Mehta, C.V. Deliwala, M.H. Shah and V.K. Sheth, *Aech. Intern. Pharmatodyn*, **138,** 480 (1962).
2. C.J. Barer, *Ger. Offen.*, **2,** 423 (1960).
3. Ciba Ltd, Brit. Pat. 1956, 745071; *Chem. Abstr.*, 8814 (1957).
4. P.J. Cranfield, Ger. Pat. (1975); *Chem. Abstr.*, 86 (1977).
5. M.P. Dave, J.M. Patel, N.A. Langalia and K.A. Thakar, *J. Indian Chem. Soc.*, **61,** 237 (1984).
6. A.W. Bauer, W.M. Kirby, J.C. Sherris and M. Turck, *Amer. J. of Clin. Path.*, **44,** 493 (1966).
7. National Committee for Clinical Laboratory Standards, Approved Standard ASM-2, Vollanova (1988).

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