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Original Article

Synthesis and antimicrobial activity of 5-{4'-[(4"-aryl) -3"-cyano 2"-hydroxy pyridine-6"-yl] phenyl carbamido}-dibenz [b,f] azepines

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ABSTRACT

5-{4'-[(4"-aryl)- 3"-cyno-2"-hydroxy- pyridine-6"-yl]-phenyl carbamido}-dibenz [b,f] azepines (4a -4k) derivatives are known to have pharmacological activities. The titled compounds (4a-4k) have been determined against various Gram +ve, Gram –ve bacteria and fungi and products are supported by IR, ^{1}H NMR, Mass spectra and elemental analysis. The titled compounds (4a-4k) have been synthesized by the condensation of 5-{4'-[(3"-aryl)-2"-Propene-1"-one]-Phenyl carbamido}-dibenz [b,f] azepines with ethyl cyano acetate and ammonium acetate

Keywords: Cyano pyridine derivaties, Antimicrobial.

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INTRODUCTION

Cyano pyridine derivative possess broad spectrum of pharmacological activities which are reflected by their use as antihypertensive[1], antiepilective[2], anticovasant[3], antiinflemmatory [4] , Herbicidal[5], Fungicide[6] , etc. In view of getting potent therapeutic agents to synthesized titles compounds. 5-{4'-[(4"-aryl)- 3"-cyno-2"-hydroxy- pyridine-6"-yl]-phenyl carbamido}-dibenz [b,f] azepines (**4a -4k)** have been synthesized by the condensation of 5-{4'-[(3"-aryl)-2"-Propene-1"-one]-Phenyl carbamido}-dibenz [b,f] azepines with ethyl cyano acetate and ammonium acetate.

5-{4'-[(3"-aryl)-2"-Propene-1"-one]-Phenyl carbamido}-dibenz [b,f] azepines(**3a -3k)** have been synthesized by the reaction of 5-(4'–acetyl phenyl carbamido)–dibenz [b,f] azepines with aromatic aldehyde in the present of aq. NaOH solution. 5-(4'–acetyl phenyl carbamido)–dibenz [b,f] azepines **(2)** have been synthesized by the condensation of 5-dibenze[b,f] azepines methanonyl chloride **(1)** with 4-amino acetophenone in ethano and pyridine.

MATERIALS AND METHODS

Antimicrobial activity: Cyano pyridine (**4a -4k)** were evaluated in vitro for antimicrobial activity against *B. Mega*, *S.aureus*, *S.taphimarium*, *E.Coli* and for antifungal activities against *A. niger* using DMF as solvent at 50 µg concentration by cup-plate method[7]. After 24 hrs. of incubation at 37 ^{0}C temp., the zone or inhibition were measured in mm. The activity was compared with the known antibiotics viz. Ampicillin chloramphenicol, Norfloaxacin, Greseofulvin at same concentration which is represented in Table-I and comparable anti-microbial activity represented in Table no. II

Method Section: All the melting points were taken in open glass capillaries and are uncorrected. IR absorption spectra were recorded on a Shimadza-FT-IR 8400 spectro-photometer using KBr pellet and ^{1} H NMR specra on a Bruker DPX-200 spectrometer (300 MHz) using DMSO as solvent and TMS as internal standard. Purity of the compounds were routinely checked by TLC using silica get G.

EXPERIMENTAL AND SPECTRAL SECTION:

(A) 5-(4'–Acetyl phenyl carbamido)–dibenz [b,f] azepines (2): A mixture of 5-dibenz [b,f] azepines methanoyl chloride (2.55 gm, 0.01 m), 4-amino acetophenone (1.35 gm, 0.01 m) in ethanol (25 ml) and pyridine (5.0 ml) was refluxed on a oil bath at 120 for 12 hrs °C. The content was poured into crushed ice, filltered and washed with water. The isolated product was crystallized from ethanol yield: 85.42%, MP. 170 °C. (Found: C, 77.85, H, 5.02, N, 7.82, $C_{23}H_{18}N_2O_2$ required C, 77.96, H, 5.08, N, 7.90%).

IR (KBr): 2958 (C–H str. asym.), 2870 (C–H Str. Sym), 1420 (C–H def.), 3056 (C–H str. aromatic), 801(C-H;str.o.p.p def.) 1509 (C=C str.), 1118 (C–N str.), 1620 (N–H bend), 1700 (C=O str.).
^{1}H NMR: 2.5 (s, 3H Ar–$COCH_3$); 6.50–6.63 (m, 4H, Ar–H), 9.95 (s, 1H, N–H).
Mass: (m/z), 103, 180, 196, 252, 238, 287, 441, 457.

(B) 5-{4'-[3"-(4"'-Methoxy phenyl)-2"-Propene-1"-one]-Phenyl carbamido}-dibenz [b,f] azepines(3g): A mixture of 5-(4'–acetyl phenyl carbamido)–dibenz [b,f] azepines (3.54 gm, 0.01 m), 4–methoxy benzaldehyde (1.36 gm, 0.01 m), methanol (25 ml) and 40% aq. NaOH solution till becomes basic medium. The reaction mixture was stirring 24 hrs at room temp. The contents were poured into crushed ice, acidified, filltered and crystalized from dioxane. yield 79.86%, M. P. : 105 °C. (Found C, 75.80, H, 5.01, N, 5.80, $C_{31}H_{24}O_3N_2$required C, 75.86, H, 5.08, N, 5.93%)
IR (KBr): 2923 (C–H str. asym.), 2852 (C–H str. sym), 1436 (C–H str. asym), 1371 (C–H str. sym) 3097 (C–H str. aromatic) 1276 (C–H i.p. def.), 821 (C–H, o.o.p. def.), 1677 (C=O str.), 1118 (C–N Str.), 3311 (N–H str.) 3045 (C=C str.), 1245 (C–O–C Str.),
^{1}H NMR: 3.62–3.86 (s, 3H, Ar-OCH_3), 7.01–7.03 (m. 18H, Ar–H), 8.08–8.72 (D. D. 4H, Ar– Hc), 4.79–4.80 (t, 4H, CH_2–Cl), 2.50–2.51 (t, 4H, -NCH_2), 9.95 (s, 1H, –NHf), 4.80–4.83 (s, 2H, CH=CH).
Mass: (m/z) 102, 109, 161, 219, 238, 252, 287, 310, 363, 372, 441, 448, 457, 472.

Similarly other chalcones (**3a -3k)** where prepared and their physical data and antimicrobial activities data published in other journal.

(C) 5-{4'-[4"-(4"'-Methoxy phenyl)-2"-hydroxy-3"-cyano pyridine-6"-yl]-phenyl carbamido}-dibenz [b,f] azepines (4g): A mixture of 5-{4'-[3"-(4"'-methoxy phenyl)-2"-Propene-1"-one]-Phenyl carbamido}-dibenz [b,f] azepines**(3g) (** (4.72 gm, 0.01 M) and ethyl cyano acetate (1.13 ml, 0.01 M) was refluxed for 10 hrs. at 110º C. in presence of aminonium acetate in methanol. The reaction mixture poured into crushed ice, filtered, dried and crystallized from ethanol, Yield : 80.82 % ; M.P. 80º C. (Found : C : 76.09; H : 4.32; N :

10.08, $C_{34}H_{24}N_4O_3$ required C : 76.20; H : 4.34; N : 10.44 %).

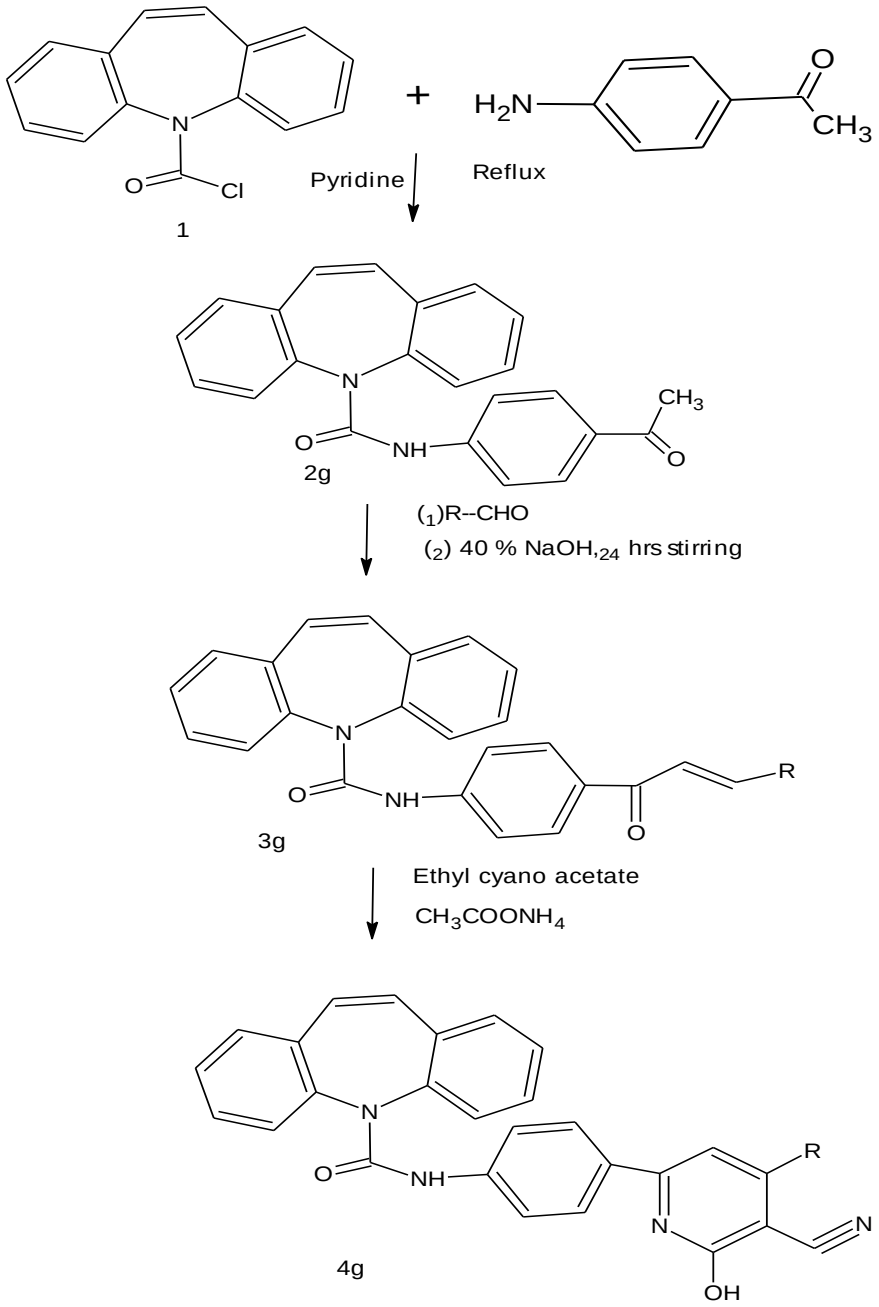
IR (KBr): 2995 (C–H str. asym), 2880 (C–H str. sym.) 1440 (C–H def. asym), 1322 (C–H def. sym.), 3030(C–H str. aromatic) 1271 (C–H i. p. def.), 887 (C–H o.o.p. def.), 1519 (C=C str), 1367 (C–N str.), 3380 (N–H str.), 1519 (N–H ben.), 1224 (C–O– C str. asym.), 1047 (C–O– C str. sym.), 2220 ($C\equiv N$ str.), 1730 (>C=O str),1367 (C–N ben.),3480 (O-H Broad)

^{1}H NMR: 3.71 (s, 3H, Ar–OCH_{3a}), 6.16 (s, 1H, N-H_b) ,2.13 (s, 3H, Ar–OCH_{3c}),6.8-7.7 (m, 16H, Ar-H_d), 6.9 (d, 2H, -Ar-H_e), 6.6 (s, 1H, Ar–N_f)

Mass: (m/z) 105, 204, 220, 311, 321, 406, 421, 430, 436, 512, 536.

Similarly other (4a – 4k) have been synthesized and their physical data represented in Table no. I

Reaction scheme



RESULTS AND DISCUSSION

Here total eleven new 5-{4'-[(4"-aryl)- 3"-cyno-2"-hydroxy- pyridine-6"-yl]-phenyl carbamido}-dibenz [b,f] azepines (**4a -4k)** derivatives compounds synthesizes and characterized using various physical methods. NMR,IR ,Mass ,Melting point and Antibacterial activity ,Antifungal activity.

CONCLUSION

5-{4'-[(4"-aryl)- 3"-cyno-2"-hydroxy- pyridine-6"-yl]-phenyl carbamido}-dibenz [b,f] azepines (4a -4k) have been synthesized. Compounds (4a),(4i),(4h) showed good remarkable antimicrobial activity compare with known standard drugs.

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Table-I: The physical data and antimicrobial activity of compounds (**4a -4k)**

Compd	R	Mol. Formula	M.P. ^{0}C	Yield (%)	N(%)		Antibacterial activity				Antifungal Acti.
					Cal.	Found	*B.mega*	*B.aures*	*S.taphi*	*E.coil*	*A.niger*
4a	C_6H_5	$C_{33}H_{22}N_4O_2$	152	62.48	11.06	11.02	20	24	21	10	12
4b	2-OH C_6H_4	$C_{33}H_{22}N_4O_3$	200	49.69	10.72	10.70	18	12	16	21	16
4c	3-OH C_6H_4	$C_{33}H_{22}N_4O_3$	125	69.72	10.72	10.69	15	16	11	11	14
4d	4-OH C_6H_4	$C_{33}H_{22}N_4O_3$	125	74.82	10.72	10.70	12	18	13	17	20
4e	4-OH, 3-OCH_3 C_6H_4	$C_{34}H_{24}N_4O_4$	120	82.42	10.14	10.11	19	19	10	18	19
4f	2-OCH_3 C_6H_4	$C_{34}H_{24}N_4O_3$	130	70.72	10.44	10.10	17	21	11	15	16
4g	4-OCH_3 C_6H_4	$C_{34}H_{24}N_4O_3$	85	80.82	10.44	10.08	14	16	15	14	18
4h	2-NO_2 C_6H_4	$C_{33}H_{21}N_5O_4$	145	79.66	12.70	12.65	11	22	16	22	22
4i	3-NO_2 C_6H_4	$C_{33}H_{21}N_5O_4$	170	66.70	12.70	12.59	21	25	21	11	13
4j	4-N,N$(CH_3)_2$ C_6H_4	$C_{35}H_{27}N_5O_2$	160	86.60	12.75	12.70	13	14	13	10	16
4k	C_4H_3O (Furfuryl)	$C_{31}H_{20}N_4O_3$	120	84.40	11.29	11.28	10	17	20	20	18

Table-II: Comparable antimicrobial Activity

S.No.	Compd	*B. Mega*	*B. Aureus*	*S.taphimarium*	*E. Coil*	*A. nigar*
	4a-4k	4a,4e, 4i	4a, 4i, 4h	4a, 4i,4k	4b, 4h, 4k	4d, 4e, 4h
1	Ampicillin (50 µg)	30	29	30	32	-
2	Chloramphenicol (50 µg)	30	32	29	28	-
3	Norfloxacin (50 µg)	35	31	27	30	-
4	Greseofulvin (50 µg)	-	-	-	-	27

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