CHAPTER THREE

EVALUATION OF

ANTIBACTERIAL ACTIVITY

EVALUATION OF BIOLOGICAL ACTIVITY

A| ANTIBACTERIAL ACTIVITY

The compounds reported in the present study were tested for their bacteriostatic activity by Cup plate method[168] and the zones of inhibition were measured to know the activity. Antibacterial activity was evaluated as follows :

a) Types of bacteria :

i) Salmonella typhi (Gram negative)

ii) Staphylococcus aureus (Gram positive)

b) Materials :

i) Nutrient agar (12-15 ml),

ii) Sterile petri dishes,

iii) Old grown culture (24 hours) in test tube

iv) Sterile pipettes,

v) Test tubes containing solution of the compounds to be tested with known concentration in acetone.

c) Preparation of sub-culture :

A uniform suspension of test organisms of 24 hrs. old culture was prepared in test tubes containing sterile saline solution. This suspension (1 ml) was then poured in each of the sterile petridishes. A sterile nutrient was then added in each petri dish. The dishes were rotated to ensure

the uniform mixing of micro-organism in the agar medium which was allowed to solidify. The agar cups were prepared with sterile cork borer with suitable dimension. The solution of each compound to be tested for antibacterial activity was added by sterile pipette aseptically into each cup. The acetone was used as control solvent. The plates were incubated at $37^{o}C$ for 24 hours. The concentration of test compound in acetone was 0.2 mg./ml. After incubation the inhibitory zones around the agar cups were observed. The diameter of inhibition zone was measured in terms of mm. The principle lying in this testing is the sensitivity of micro-organism to organic compound by diffusion through agar medium.

d) Zones of inhibition :

i)	Strong growth inhibitor	(Zone size 15-20 mm : +++)
ii)	Moderate growth inhibitor	(Zone size 9-14 mm : ++)
iii)	Less growth inhibitor	(Zone size 6-8 mm : +)
iv)	No growth inhibitor	: -

The antibacterial activity of the compounds was tested and the results are tabulated in Table 3.

Table - 3

ANTIBACTERIAL SECREENING RESULTS OF VARIOUS COMPOUNDS

SA - Staphylococcus aureus

S T - Salmonella typhi

Sr.No.	Name of the compound	Antibacterial activity SA	S T
	Series (I)		
4	N-propylamino-2,5-dimethyl-3-phenyl indole	+	++
4_a	N-(N-Acetylamino propyl)-2,5-dimethyl-3 -phenyl indole	-	+
4_b	N-(N-Dimethylamino propyl)-2,5-dimethyl-3-phenyl indole	+	++
4_c	N-(N-Phenyl carbamylaminopropyl)-2,5-dimethyl-3-phenyl indole	-	+
4_d	N-(N-Acetamidylamino propyl)-2,5-dimethyl-3-phenyl indole	-	+
4_e	N-(N-Benzoylamino propyl)-2,5-dimethyl-3-phenyl indole	-	+
4_f	N-(N-4-Hydroxy benzilidene amino propyl)-2,5-dimethyl-3-phenyl indole	+	++
4_g	N-(N-4-Dimethylaminobenzilidene amino propyl)-2,5-dimethyl-3 phenyl indole	+	++
4_h	N-(N-p-Chlorophenoxy-1,3,4-oxadiazole meth-2-yl amino propyl)-2,5-dimethyl-3 phenyl indole	-	+
4_i	N-(N-Phenylthiocarbamyl amino propyl)-2,5-dimethyl-3-phenyl indole	-	

.....contd.

Table - 3 (contd..)

Sr.No.	Name of the compound	Antibacterial activity SA	ST
	Series (II)		
IV	N-Propylamino-2,3-dihydro-5-methyl indole	+	++
IV_a	N-(N-Dimethylamino propyl)-2,3-dihydro-5-methyl indole	-	+
IV_b	N-(N-Propylamino propyl)-2,3-dihydro-5-methyl indole	-	+
IV_c	N-(N-Acetylamino propyl)-2,3-dihydro-5-methyl indole	-	+
IV_d	N-(N-Benzoylamino propyl)-2,3-dihydro-5-methyl indole	-	+
IV_e	N-(N-Phenylcarbamylamino propyl)-2,3-dihydro-5-methyl indole	-	+
IV_f	N-(N-Phenylthiocarbamyl amino propyl)-2,3-dihydro-5-methyl indole	-	+
IV_g	N-(N-p-Dimethylaminobenzilidine amino propyl)-2,3-dihydro-5-methyl indole	+	++
IV_h	N-(N-p-Hydroxy benzilidene amino propyl)-2,3-dihydro-5-methyl indole	+	++
IV_i	N-(N-p-Methoxy benzilidene amino propyl)-2,3-dihydro-5-methyl indole	+	++
IV_j	N-(N-Cinnamilidene amino propyl)-2,3-dihydro-5-methyl indole	-	++
IV_k	N-(N-2-Methylcyclohexilidene amino propyl)-2,3-dihydro-5-methyl indole	-	++

.....contd.

Table - 3 (contd.)

Sr.No.	Name of the compound	Antibacterial activity SA	ST
IV_l	N-(N-Carboethoxymethyl amino propyl)-2,3-dihydro-5-methyl indole	-	+
IV_m	N-(N-Cyclohexelidene amino propyl)-2,3-dihydro-5-methyl indole	+	++
	Series (III)		
IV'	N-Propyl amino-2-methyl-3-phenyl indole	+	+++
V'	N-(N-Phenyl carbamyl amino propyl)-2-methyl-3-phenyl indole	+	+
VI'	N-(N-Dimethyl amino propyl) 2-methyl-3-phenyl indole	+	++
VII'	N-(N-Mono ethyl amino propyl)-2-methyl 3-phenyl indole	+	+
	Series (IV)		
IV"	N-Propylamino-2,3 dihydro indole	+	++
$IV"_a$	N-(N,N-Dimethyl amino propyl) 2,3-dihydro indole	+	+
$IV"_b$	N-(N-Phenyl carbamyl amino propyl) -2,3-dihydro indole	+	++

DISCUSSION ON ANTIBACTERIAL ACTIVITY

With regards to the study of antimicrobial activity of all the compounds included in the present dissertation were screened for their antibacterial activity against Staphylococcus aureus (Gram +ve) and Salmonella typhi (Gram -ve) bacteria. On the basis of the results obtained during the screening of various compounds for antimicrobial activity, the following conclusion could be drawn.

(1) Series I : N - Propylamino-2,5-dimethyl-3-phenyl indole and its derivatives (4 & 4_{a-i})

The compounds of this series 4_b, 4_f and 4_g have exhibited moderate antibacterial activity against Salmonella typhi (Gram -ve) at 0.2 mg/ml concentration, but they have exhibited less antibacterial activity against Staphylococcus aureus (Gram +ve) which has already mentioned by Trzhtsinskaya et.al[150]. The presence of N-dialkyl chain in the compound (4_b) and N-aldimino alkyl links i.e. (-N=CH-R) in compounds 4_f and 4_g at N_1 position of indole nucleus has shown the antibacterial activity same as compound (4). Other compounds of this series 4_a,4_c,4_d, 4_e, 4_h, and 4_i have exhibited less antibacterial activity against Salmonella typhi and no activity against Staphylococcus aureus.

(2) Series II : N-Propylamino-2,3-dihydro-5-methyl indole and its derivatives (IV, IV_{a-m})

The compounds IV, IV_g, IV_h, IV_i and IV_m of this series have exhibited less activity against Staphylococcus aureus like the compound in the series (I). Further the compounds IV , IV_g, IV_h, IV_i, IV_j, IV_k and IV_m have shown moderate antibacterial activity against Salmonells typhi, while IV_a, IV_b, IV_c, IV_d, IV_e, IV_f, IV_l and IV_m were found to be less bacteriostatic against the same type of bacteria.

(3) Series III : N-Propylamino-2-methyl-3-phenyl indole and its derivatives (IV', V' to VII')

The compound N-propylamino-2-methyl-3-phenyl indole (IV) have exhibited the strong antibacterial activity against Salmonella typhi as measured in terms of zones of inhibition while its dimethyl derivative (V') was found to be moderately active. The compounds VI' and VII' were found to be less active against same type of the bacteria. All the compounds of this series were also found to be less active against Staphylococcus aureus.

(4) Series IV : N-propylamino-2,3-dihydro indole and its derivatives (IV", $IV"_a$ and $IV"_b$)

The compounds IV" and $IV"_b$ were found to be moderately bacteriostatic against Salmonella typhi while compound $IV"_a$ was found to be less active. Further, these compounds were found to be less active against Staphylococcus aureus.

In conclusion among these four series of the compounds included in this dissertation the N-propylamino indoles and N-(N:N-dimethylamino propyl) indoles are of considerable biological importance.