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Synthesis and Evaluation of Thiazolidine-4-One for their Antibacterial Activity

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ABSTRACT:

A new series of Thiazolidine-4-one showed diversified antibacterial activities. In view of potential antibacterial activities of thiazolidine-4- one derivative were prepared by schiffs base technique. The compound were screened by antibacterial activity, thiazolidine -4-one also showed antifungal activit hypoglycemic activity, anti-convulsant activity, analgesic activity, anti-tubercular activity and anti-inflammatory activity.Thiazolidine-4-one also related to ketone group, amine group, sulpher group and thiazolidine ring.

Keywords: Schiffs base. Thiazolidine -4- one. Anti-bacterial activity.

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INTRODUCTION:

The development antibacterial agents has been a very important step for research, most of the research programme efforts are directed toward the design of new drugs, because of the unsatisfactory status of present drugs side effects and the acquisition of resistance by the infecting organism to present drugs. The resistance of common pathogens to standard antibiotic therapy is rapidly becoming a major health problem throughout the world. These are real perceived need for the discovery of new compounds endowed with antibacterial property. Synthesis of thiazolidine-4-one derivatives were reported to have potential anti-fungal activity.[1] The presence of reactive unsaturated ketone group in thiazolidine-4-one is responsible for their antibacterial activity, analgesic activity, anti- convulsant activity, anti-tubercular activity, [2-4] and analgesic activity, anticonvulsant activity, antibacterial activity,[5] important molecule also reported hypoglycemic activity,[6] antibacterial activity[7], antiparkinsonism activity[8], antioxidant activity[9], non-narcotic analgesic activity[11,] anticonvulsant activity[11], scheme given fig no1, have played an important role in medicinal chemistry.

MATERIAL AND METHODS

Melting points were determined by open capillary method and are uncorrected. The IR (KBr) spectra were recorded on thermo Nicolet IR-200 spectrophotometer. The ^{1}H-NMR spectra were recorded on varian NMR 400 MHz spectrometer using CDCL3 as a solvent and TMS as internal standard. The purity was confirmed by using TLC. Thiazolidine 4 one were prepared as the method of Schiff base as the synthetic procedures involved, the two steps as stated below.

STEP-I The synthesis of schiffs base from sulphanilamide.

To a mixture of Sulphanilamide 0.01 mol and aromatic aldehyde 0.01mol in a 50 ml round bottom flask, add 25 ml Ethanol, few drops of 20% KOH solution were added and the reaction mixture was refluxed for 18-20 hrs. The reaction mixture was kept a side for cooling and then poured in to crushed ice with vigorous stirring. The solution of reaction mixture was acidified with 10% HCl to remove unreacted amines. Then the product was recrystalized from appropriate solvent and dried.

STEP-II The synthesis of 4–oxo-thiazolidine using mercapto acetic acid.

The equimolar quantities of schiffs base and mercapto acetic acid were taken in a 50 ml round bottomed flask containing 25 ml THF and small quantity of anhydrous Zncl2. The content of the flask were refluxed on a water bath for 10-12 hrs. Solvent was evaporated to small volume and cooled, then the concentrated reaction mixture was triturated with 20% sodium bicarbonate solution to remove unreacted acids. Solution was filtered to collect solid. T solide thus obtained was recrystalized using appropriate solvent and dried.

Anti-bacterial activity[1-4]

Anti-bacterial activity of all synthesized compound was determined by the disc diffusion method against the gram +ve organism.

Bacillus subtills and Bacillus pumilis and gram –ve organisms E-coli, pseudomonas aeruginosa at 100mg/mL concentration. The bacteria's were sub cultured in nutrient agar medium. The petri dishes were incubated at 37^0C for 24hours. Standard antibacterial drug ampicillin at 100mg/ml concentration was also increased under similar conditions.

RESULTS AND DISCUSSION

Anti-bacterial activity[1-4]

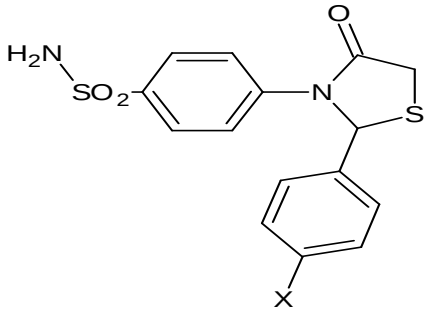
The synthesized 5 compounds were screened for the antibacterial activity studies at 50ug/ml and 100ug/ml using DMSOas a control against staphylococcus aureus, Bacillus pumilis bacillus subtilis Ecoli and pseudomonas aerginosa by disk- diffusion method on nutrient agar mediaand standard drug for the comparison at the concentration 50ug/ml and 100ug/ml against gram positive and gram negative bacteria used for the study.

Data in the table no. 3 clearly indicates that compound exhibits antibacterial activity. The zone of inhibition of the entire synthesized compounds was between 7-10 mm at 50ug/ml concentration and 11-13 mm at 100ug/ml concentration.

Table 1 Physical characterization data of synthesized compounds (B_1-B_5)

Sr. No.	Compound code of schisffs bases	R	Compound code of derivative	R
1	Ta_1	H	Tb_1	H
2	Ta_2	OCH_3	Tb_2	OCH_3
3	Ta_3	Cl	Tb_3	Cl
4	Ta_4	NO_2	Tb_4	NO_2
5	Ta_5	OH	Tb_5	OH

Figure 1 Synthesized compound of thiazolidine 4 ones



Thiazolidine 4 ones

Antibacterial Activity

The synthesized 5 compounds were screened for the Antibacterial activity studies at 50µg/mL and 100µg/mL using DMSO as a control against staphylococcus aureus, Bacillus pumilis, Bacillus subtilis, Escherichisa coli and Pseudomonas aeruginosa by disk-diffusion method on nutrient agar media, Ampicillin was used as standard drug for the comparison at the concentration 50µg/mL and 100µg/mL against Gram-positive and Gram-negative bacteria used for the study.

Data in the Table.No-3 Clearly indicates that the compound exhibits antibacterial activity. The zone of inhibition of the entire synthesized compounds was between 7-10 mm at 50µg/mL concentration and 11-13 mm at 100µg/mL concentration.

Table 2 Spectral data of Synthesis of Thiazolidine – 4- one derivative: IR and NMR Spectra

IR. Tb_1. Tb_2. Tb_4	**NMR. Tb_1. Tb_2.**
IR(KBR):NH(s)3368cm-1. C=O(s)1594cm-1,S=O (s)1005cm-1, C=C(s) 1726 cm-1, CH(b)1399 cm-1, C-S(s) 1157 cm-1.	1NMR(DMSO): CH2-s-(2.25), CH-s- (5.80),NH2-s-(8.71),Ar-H,9H-m-(7.01).
NH(s)3371cm1,C=O(s)1670cm-1,S=O(s)4027cm1,C=C(s)1718cm1,CH(b)1329cm1,CS(s)1153 cm-1.	
N-H(s)3382cm-1, C=O(s)1681 cm1,S=O(s)1093cm-1C=C(s)1685cm-1,C-H(b)1313cm-1,C-S(s)1152 cm-1, N=o(s)1458 cm-1.	OCH3-s-(2.11),CH-s-(7.10),NH2-s-(11.02),Ar-H,8H-m-(7.94-8.4), CH2-s-(3.29).

Table 3 Antibacterial activity of newly synthesized thiazolidine-4-one derivatives.

Sample code	**Inhibition zone diameter in nm**							
	B.subtills		**B.pumills**		**E.coli**		**P.aureaginosa**	
	50µg	**100 µg**	**50µg**	**100 µg**	**50µg**	**100 µg**	**50µg**	**100 µg**
B1	9	13	9	12	9	13	8	13
B2	8	12	8	13	8	11	8	12
B3	9	12	9	12	9	12	9	12
B4	8	13	8	11	8	13	9	11
B5	6	11	7	8	7	10	8	11
Ampicillin	22	34	21	32	22	35	24	34
DMSO	-	-	-	-	-	-	-	-

*Average of triplicate ± standard deviation

Note:- " _" denotes no activity, 7-9 mm better activity,10-13 mm good activity.

Whereas the zone of inhibition of standard drug Ampicillin was 21-24 mm at 50µg/mL concentration and 32-35 mm 100µg/mL concentration, many studies have revealed that thiazolidine -4- one derivatives, are having good antibacterial activity, the synthesized compound exhibits such anti-bacterial activity of the 4 – oxo- thiazolidine derivatives.

CONCLUSION

Thiazolidine 4 one derivatives exhibited Antibacterial activity in which some are good and moderately active like standard employed for comparison therefore further a detailed study of toxicity is necessary, and show Antibacterial activity,

All the synthesized compounds were characterized by using FT-IR, ^{1}H-NMR spectral techniques. The synthesized molecules were screened for antibacterial activity. Among the synthesized compounds B1 and B3 **s**howed significant activity when compared to standard.

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