

# A review on antimicrobial activities of important thiazines based heterocycles

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## ABSTRACT

Nowadays, a number of thiazine-based heterocycles were prepared or extracted from natural sources such as plants and animals, using various approaches and examined for their biologically important activities such as antibacterial, antifungal, anti-inflammatory, and antihypertensive to apply them as a possible pharmacological and chemical agents in a range of medicinal fields. Although several dynamic antimicrobial agents have since been developed, a allocated co-occurrence through the employ of current drugs as a single agent has developed drug resistance. This has made use to investigate for novel thiazine derivatives for ruling more effective antimicrobial agents. Thus, the present review was designed to provide a sequence of work going on the development of potential antimicrobial agents.

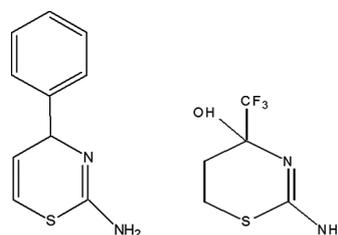
**KEY WORDS:** Antibacterial, Antifungal, Antimicrobial activities, Thiazines

## INTRODUCTION

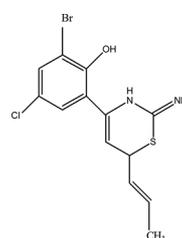
Heterocycles are considering as the main section of organic chemistry. Furthermore, they are of massive importance not only equally biologically and industrially but also to the effecting of any developed human society as well.<sup>[1-5]</sup> Heterocycles which contain N and S atoms possess a massive result in the field of medicinal as well as pharmaceutical chemistry. Thiazines are well-known nitrogen and sulfur containing heterocyclic compounds. These have been reported to possess a variety of biological activities such as antibacterial, antifungal, anti-inflammatory, and antihypertensive. Thus, based on literature, the present review was designed to provide a sequence of work going on the development of thiazine containing potential antimicrobial agents.<sup>[6-10]</sup>

### Review of Literature Based on Antimicrobial Activities

The presence of thiazine ring in synthesized 4H-1,3-thiazine and dihydrothiazine derivative make them interesting in pharmaceutical industries and consider as potential antimicrobial agents.<sup>[11,12]</sup>



1,3 thiazines are show excellent activity against different types of microbes such as *Escherichia coli*, *Staphylococcus aureus*, *Bacillus subtilis*, and *Phaseolus argenosa*.<sup>[13]</sup> Existence of heteroatoms and phenyl group increases their activities and makes them an interesting therapeutic agent.



1,3 thiazines and their derivatives synthesized by the condensation of 5-chloro-chalcones with derivatives of thiourea in ethanol show potential antimicrobial activity and consider as antimicrobial agents.<sup>[14]</sup>

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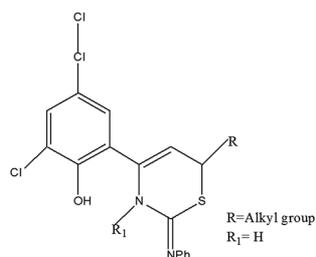
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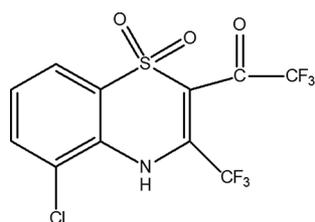
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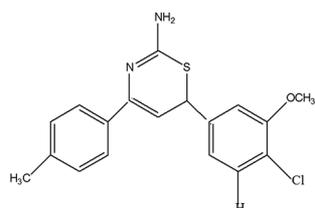
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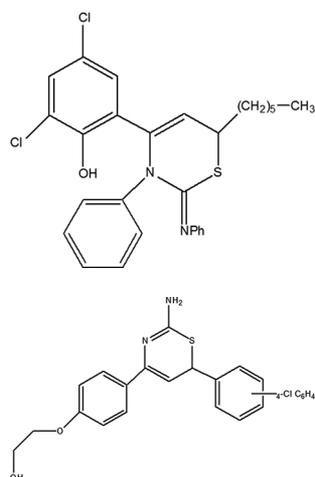
4H-benzothiazines and their sulfone are exhibit excellent activities against different types of bacteria strain such as *E. coli*, *S. aureus*, and *B. subtilis* as well as exhibit antifungal activities with different stains, and therefore, may be treated as potential antimicrobial agents.<sup>[15]</sup>



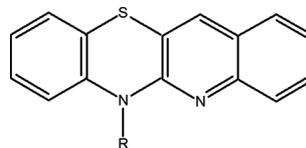
Novel chalcones and heterocycles contain more than one heteroatom and synthesized from different benzaldehydes with a range of acetophenones exhibit excellent antibacterial activity with different strains of microbes.<sup>[16]</sup>



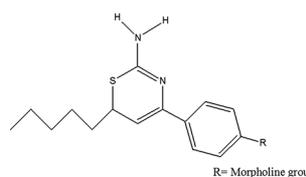
Thiazine derivatives containing phenyl groups were synthesized and tested for antibacterial activities and show evidence of excellent biological activities against different strains of bacteria, thus acting as potential antimicrobial agents.<sup>[17,18]</sup>



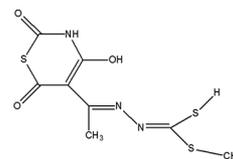
On the basis of structure-activity relationship, it has been observed that linearly fused quinobenzothiazines show modest antimicrobial activity, weaker than angularly quinobenzothiazines. The presence nitrogen substituent in the thiazine ring is essential for their antibacterial activity.<sup>[19]</sup>



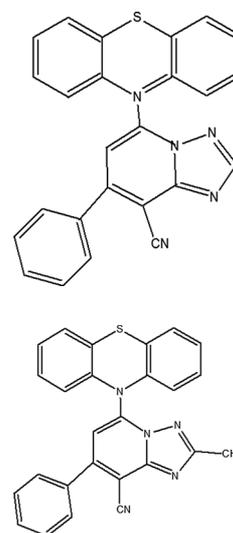
1,3-thiazines associated with substituted morpholinylphenyl group and their derivatives have significant antibacterial and antifungal potential against a variety of strains of bacteria and fungi.<sup>[20]</sup>

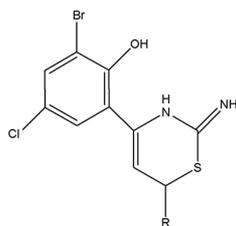


Heterocyclic compounds mainly thiazines derivatives substituted by hydroxyl (-OH) functional groups which contain sulfur atom were synthesized and examined for biological activities such as antimicrobial activities and treated as prospective antimicrobial agents.<sup>[21]</sup>



Benzothiazines and phenothiazines both types of heterocycles in the present days play a very important role in pharmaceutical chemistry and medicinal chemistry field. Both compounds exhibit outstanding antibacterial activities and believed as latent antibacterial agent.<sup>[22-24]</sup>





## CONCLUSION

On the basis of literature and our continuous interest for searching of potential bioactive active compounds and effective therapeutic agent such as antimicrobial agents, we hope to have given a clear idea of the usability of pharmaceutical heterocycles-thiazine compounds as latent antimicrobial agents. In this review, we would like to complete the above work with a positive view for the future growth of expansion of antimicrobial agents. This constructive vision comes from the confidence that the work reported here will be the starting of an immense move on this promising field in the near future.

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