

Synthesis and biological screening of novel thiourea derivatives as potential antihyperglycemics

Tapan Kumar Maity¹ and Satarupa Acharjee^{1,2}

¹Jadavpur University, India.

²NSHM College of Pharmaceutical Technology, India



Abstract

Background: The prevalence of Type II Diabetes Mellitus is growing in epidemic proportions globally followed by late complications of neuropathy, nephropathy, cardiovascular risks and obesity on increased duration. Although diabetes is among the top national priorities of medical research, diabetes care in India leaves much to be desired. In India, more than half of patients have poor glycaemic control and have vascular complications. Therefore there is a persistent need for exploration of new molecular targets and strategies to develop safer and effective antihyperglycemics which can also cater to the management of long term complications of type-2 diabetes. Intrigued by the benefits of hybrid molecules involving multiple ligands in management of multi-factorial diseases, thiourea derivatives coupled with chalcones moiety have been developed as each of these moieties have independently shown considerable potential antihyperglycemic action.

Aim of work: A new series of hybrid thiourea derivatives were designed and synthesized to meet the structural requirement essential for antihyperglycemic activity. The current work aimed to explore the effect of these hybrid thiourea derivatives on an experimental model of type 2 diabetes.

Methods: Eight different substituted [1-{3-[(2E)-3-phenylprop-2-enoyl] phenyl} thioureas were synthesized using ([N-[(3-acetyl phenyl) carbamothioyl] benzamide] and corresponding benzaldehyde as a starting material. All the compounds were confirmed by means of IR, ¹H NMR, and ESIMS and evaluated for in vivo antihyperglycemic activity by using STZ induced Wistar male rat model. Further pancreatic β -cell function of each group was assessed by measuring BUN, serum TRIG, HDL cholesterol, LDL cholesterol, serum total proteins.

Result: Administration of low dose Streptozotocin (STZ) to rat, induced hyperglycemia along with considerable augmentation in blood urea nitrogen, creatinine and serum triglycerides markers of renal insufficiency and diabetes induced cardiac complications respectively. Among the six compounds screened, Compound I, V, VI, VII were able to reduce significantly the increased glycemia level to normal within a period of 24 hours in the STZ model along with significant improvement in the blood urea nitrogen and serum triglyceride level by compound I, V.

Conclusion: This observation indicates that compound I-VI have the potential to be an effective antihyperglycemic agent. Studies are underway to assess the renoprotective and cardioprotective effects of these compounds and their possible mode of action.



Biography:

Tapan Kumar Maity had completed his Bachelor, Masters and PhD from Jadavpur University, Kolkata, India. He has been in teaching as well as research since 28 years. 13 no. research scholars have been awarded Ph.D. under his guidance and presently seven students are doing research work under his supervision. Recently two centrally funded project works have been completed successfully from his laboratory. Prof. Maity's Lab. is dedicated to synthetic medicinal chemistry as well as plant drug research. This lab is targeting cancer/diabetes with the isolated molecule from plant extract and novel synthetic compounds. Already 92 papers were published in the national and international journal till now. He has visited USA, Austria, Switzerland and The Netherlands. He is the life member of Association of Pharmaceutical teachers of India, Indian pharmaceutical association, Indian science congress association and Society of Ethnobotany, India. He is the paper setter, evaluator and Ph.D. thesis examiner of 18 universities in India.

Speaker Publications:

1. "Isolation of cytotoxic monomeric protein and morin derivatives from *Solenan amplexicaulis* (Lam.) Gandhi"; Natural Product Research

2. “Analgesic and Anti-Inflammatory Activities of Quercetin-3-methoxy-4'-glucosyl-7-glucoside Isolated from Indian Medicinal Plant *Melothria heterophylla*”; *Journals Medicines* Volume 6 Issue 2
3. “Antihyperglycemic activity of chalcone based novel 1-{3-[3-(substituted phenyl) prop-2-enoyl] phenyl} thioureas”; *Synthetic Communications* Volume 48(23).
4. “SYNTHESIS, PHARMACOLOGICAL EVALUATION AND LIGAND-PROTEIN INTERACTION STUDY OF HYBRID UREA AND THIOUREA DERIVATIVES AS ANTIHYPERGLYCEMIC AGENTS”; *International Research Journal of Pharmacy* 9(5):36-44/ ISSN 2230 – 8407
5. “Betulinic Acid, the first lupane-type triterpenoid isolated via bioactivity-guided fractionation, and identified by spectroscopic analysis from leaves of *Nyctanthes arbor - tristis* : its potential biological activities in vitro assays”; *Natural Product Research* 33(22):1-6.

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