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Synthesis and Evaluation of Morpholine Derivatives for the Management of Pain

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ABSTRACT

ORIGINAL RESEARCH ARTICLE

Pharmaceutical drug discovery is an expensive and time consuming process. The development of a drug from an initial idea to its entry into the market is a very complex. It is a development process involves use of variety of computational techniques. The idea for a new development can come from a variety of sources which include the current necessities of the market. The impact of pharmaceutical chemistry on the normal human life span and on the quality of life enjoyed by most people is hard to overestimate. Thus the current study was designed to synthesis and evaluation of morpholine derivatives for the management of pain.

INTRODUCTION

Current trends in drug design often rely heavily on artificial intelligence (AI) and machine learning applications in the pharmaceutical industry. AI and ML models are finding applications in shortening the time taken for drug development, increasing the probability of success of preclinical and clinical trials, anticipating the toxicity of drugs, improving the pharmacokinetics of drugs and supporting rationally designed drug. There is much greater scope for drug design in the future. [1] Pain is an disagreeable sensory and touching feeling accompanying existing or impending tissue damage or referenced to such harm. Pain is the most common experience reported by patients, and patient anxiety is a form of warning signal. It is a sensual and perceptual phenomenon, which causes suffering and emotional state of risks connected with anxiety. Pain has many forms. It warns against damage to the body, which is important for avoiding injuries and consequently for survival. Pain not caused by acute injuries can be disagreeable for the patient, or it can alter a person's life, reduce the quality of life, and also have an impact on the patient's family. The word "pain" for the patient means disease and suffering, for the doctor it is a symptom, and for the physiologist it is a kind of feeling that has its own anatomical and physiological system which begins with the receptors and ends up in the brain cortex. [2] Feeling is a physical sensation that can be confirmed by electrophysiological methods, but in practice it is only a subjective sensation. The impact of pharmaceutical chemistry on the normal human life span and on the quality of life enjoyed by most people is hard to overestimate. Thus, the current study was designed to synthesis and evaluation of morpholine derivatives for the management of pain.

EXPERIMENTAL WORK

Physical characterization of morpholine

Physical characterization of morpholine involves evaluating its fundamental physicochemical properties to confirm identity, purity, and quality.

Experimental Synthesis of Morpholine Derivatives

A new series of morpholine derivatives was prepared by reacting the morpholine with

ethyl chloro acetate in the presence triethylamine as a catalyst in benzene gave morpholine-N-ethyl acetate (1) which reacted with hydrazine hydrate in ethanol, and gave morpholine-N-ethyl acetohydrazide (2) . Morpholine-N-aceto semithiocarbazide (3) were prepared by reacting compound (2) with ammonium thiocyanate, concentrated hydrochloric acid and ethanol as a solvent. Compound (3) reacted with sodium hydroxide and hydrochloric acid to give 5-(morpholine-Nmethylene)-1H-1,2,4-triazole-3-thiol. [3]

Evaluation of analgesic activity by Tail Flick Method

The analgesic activity of the synthesized compounds was evaluated by tail-flick method. Swiss Albino mice (n=6) were chosen by random sampling technique for the study. Diclofenac sodium at the dose of 10 mg/kg was administered as standard drug for comparison. The test compounds were administered by the oral routes at the dose level of 200 mg/kg b.w. The mice were hold in position by proper restrainers with the tail extending out and the tail (up to 6 cm) was taken and dipped in a beaker. In that beaker water should be maintained at 56± 4^0C. The time in sec taken by the mice to withdraw their tail completely out of water was taken these are the reaction time. The observation was carried out at 0, 30, 60, 90 and 120 min after the administration of our synthesized compounds. A cut off point of 15 sec was observed to avoid the tail damage. [4-6]

RESULTS AND DISCUSSION

Physical description of morpholine

Morpholine is a stretchy moiety, a special pharmacophore and an amazing heterocyclic compound with wide scopes of pharmacological exercises because of various pharmacological of activity.

Table 1 Physical characterization of Morpholine

S.N.	Property	Findings
1	Molecular formula	C_4H_9NO
2	Molecular weight	87.12 g/mol
3	Solubility	Completely miscible (soluble) in water and readily dissolves in most organic solvents including acetone, benzene, methanol, ether, and ethanol
4	Melting point	4.9 °C to -3.1 °C
5	Boiling Point	128.9 °C to 130 °C
6	Appearance Odor	A clear, colorless, hygroscopic liquid with a distinct fishlike or ammonia-like odor.

Evaluation of analgesic activity by Tail Flick Method

Most of the synthesized compounds had shown interesting analgesic activity on tail flick method. Highest analgesic activity was observed at 120 min for synthesized compounds, observations obtained at the 120 min had been selected as the basis of discussion. When compared with standard drug diclofenac the compounds exhibited comparable analgesic activity.

The findings were shown in table 2

Table 2 Analgesic activity of the Synthesized Compounds

Groups	Dose (mg/kg)	0 min.	30 min.	60 min.	90 min.	120 min.
Control	-	3.2±0.15	3.5±0.10	4.1±0.25	4.7±0.20	4.9±0.10
Standard (Diclofenac)	10	2.2±0.10	6.1±0.50	9.2±0.10	11.5±0.10	12.5±0.10

SC 1	100	3.4±0.15	8.6±0.30	10.5±0.60	12.25±0.15	12.5±0.10
SC 2	100	3.1±0.20	8.5±0.20	10.3±0.40	12.50±0.30	12.5±0.10
SC 3	100	3.2±0.10	9.1±0.40	10.8±0.50	11.5±0.15	12.5±0.10

CONCLUSION

The impact of pharmaceutical chemistry on the normal human life span and on the quality of life enjoyed by most people is hard to overestimate. The current study was designed to synthesis and evaluation of morpholine derivatives for the management of pain. The findings justified the selective objective.

REFERENCES

1. Kaylene M.P, Jasim A.R, Christopher B. Synthesis, identification and antiplatelet evaluation of 2-morpholino substituted benzoxazines. Europen Journal of Medicinal Chemistry. 2007; 42, 1200-1210.
2. Mithun A, Bantwal S.H, Boja P. Convenient one pot synthesis and antimicrobial evaluation of some new Mannich bases carrying 4-methylthiobenzyl moiety. Europen Journal of Medicinal Chemistry. 2011; 42, 1095-1101.
3. Lotfi T.T, Florent B, François M, Patricia B , Yves L. M. Synthesis of purin-2-yl and purin-6-ylaminoglucitols as C-nucleosidic ATP mimics and biological evaluation as FGFR3 inhibitors. Europen Journal of Medicinal Chemistry.2011; 46, 1254-1262.
4. Das BK, Al-Amin MM, Russel SM, Kabir S, Bhattacherjee R, Hannan JM. Phytochemical screening and evaluation of analgesic activity of *Oroxylum indicum.* Indian Journal of Pharmaceutical Sciences. 2014; 76(6):571-5.
5. Mali AA, Bandawane DD, Hivrale MG. Evaluation of anti-inflammatory and analgesic activity of methanol extract of *Cassia auriculata* leaves. Pharmacologia. 2013; 4(2):117-25.
6. Patil K, Reddy SK. Dose comparative evaluation of analgesic activity of simvastatin in wistar rats. National Journal of Physiology, Pharmacy and Pharmacology. 2019; 9(6):472-475.