International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

A Review on Synthesis, Characterisation and Biological Screening Of Novel 1,4–Dihydropyridine Derivatives For Certain Pharmacological Activites

Mathew George[1], Lincy Joseph[2], Chippy Joseph[3]

[1, 3]Department of Pharmacology, Pushpagiri College of Pharmacy, Thiruvalla -689107, Kerala, India

[2]Department of Pharmaceutical Chemistry, Pushpagiri College of Pharmacy, Thiruvalla -689107, Kerala

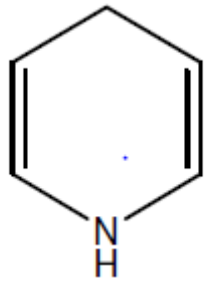
Abstract: ***A series of 1, 4-dihydropyridine derivatives were prepared from three compounds condensation reaction of ethylacetoacetate, aromatic aldehyde and ammonium acetate at 70^{0}C. Derivatives of 1,4-dihydropyridines are one of the most potent calcium antagonists. The compound exhibits various pharmacological actions which include substitution at the 4th position possess calcium channel antagonist property while the heterocyclic ring of the compound possesses pharmacological actions like antihypertensive[1] anti-inflammatory, antifungal , analgesic ,antimicrobial , antithrombotic actions. It also shows vasodialation , anticonvulsant and stress protective effect by binding to L and N channels[2].***

Keywords: Calcium channel blocker , 1,4- Dihydropyridine **,** antihypertensive , anti-inflammatory, analgesic activity

1. Introduction

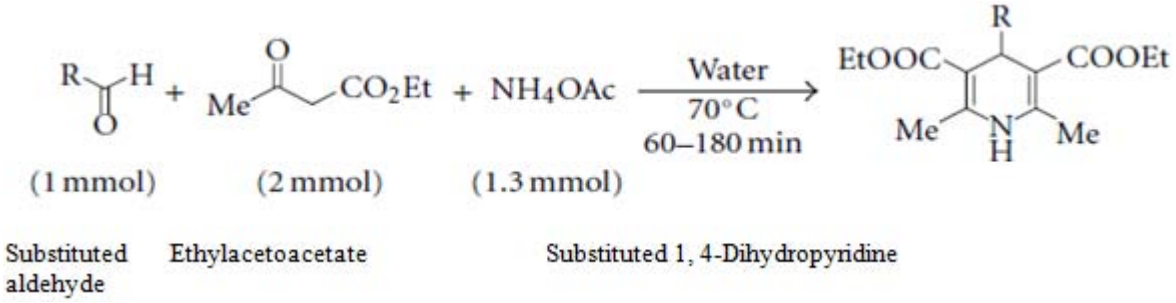
Medicinal chemistry is a multidisciplinary subject involving organic chemistry, pharmacology, biochemistry, physiology, microbiology, toxicology & genetics. It is concerned with the design, development , identification , and synthesis of compounds that can be used for prevention , treatment or cure of human or animal disease and study of their metabolism , interpretation of their mode of action at molecular level and construction of structure activity relationship (SAR).

Dihydropyridines are the derivatives of pyridine which belong to an important group of heterocyclic compounds containing nitrogen in a six member ring which is saturated at the 1st and 4th position of pyridine.



1,4 - DHP

A series of 1, 4-dihydropyridine derivatives were prepared from three compounds condensation reaction of ethylacetoacetate, aromatic aldehyde and ammonium acetate at 70^{0}C.



Determination of physico-chemical properties of the synthesized compounds by melting point, solubility profile and thin layer chromatography. Structure elucidation of the synthesized compounds by I.R. and N.M.R.

The synthesized compounds are screened for its antimicrobial , analgesic , anti inflammatory , anticonvulsant and antioxidant activites. Antimicrobial activity is determined by agar plate diffusion method with ciprofloxacin as standard. Analgesic activity is determined by eddy's hote plate method with tramadol as standard. Anti- inflammatory activity is determined by using carrageenan induced paw edema method. Anticonvulsant activity is determined by maximal electroshock method with phenytoin as standard. Antioxidant activity is determined by H_2O_2 scavenging method .

2. Literature Review

1) **Amit Pramanik**etal ; 2012 synthesized some new derivatives of 1,4 – dihydropyridine by reacting different aldehydes with ethylacetoacetate in presence of ammonium acetate. It is an on –water- catalyst free

ecofriendly synthesis . Result suggests that this synthesis produce high yield & purity.

2) **N. SRINIVASA RAO** etal ; 2013 synthesized 1,4 dihydropyridine derivatives from three compounds , ethylacetoacetate aromatic aldehyde and ammonium hydroxide. A new series of compounds (1,4 -di hydro-2,6-di methyl-4-aryl substituted pyridine-3,5-die-α-napthal amide) is prepared by reacting the condensation product with α-naphthyl amine and the synthesized compounds were also screened for antimicrobial properties.
3) **V.Nirai etal;** 2012 synthesized 1,4 dihydropyridine deivatives by reacting different aldehyde with acetyl acetone and ammonium acetate under solvent free conditions. The results suggest that the aldehydes with electron-donating substituents required longer times to complete the reaction than the aldehydes containing electron withdrawing substituents
4) **Prasanna A. Datar** etal; 2012 designed and synthesized novel 4-substituted 1,4-dihydropyridine derivatives as hypotensive agents by reacting different aldehydes with ethylacetoacetate and ammonium acetate .The results suggest that the compounds decreased mean arterial blood pressure significantcly , while no effect on the heart rate in rats.
5) **S. Indumathi** etal;2015 synthesize 1,4-dihydropyridine derivatives(2,2'-{[4-(furan-2-yl)-2,6-dimethyl-1,4-dihydropyridine-3,5-diyl] dicarbonyl}dihydrazinecarbothioamide) and thesynthesized compounds were screened for in vivoPharmacological activity such as anticonvulsant, analgesic and anti-inflammatory activities. Among the pharmacological screening the synthesized compound showed t better activity against anti-inflammatory when compared with the standard drugs (Diclofenac sodium).
6) **B. Vijayakumar,** 2013synthesize 1,4-dihydropyridine derivatives by reacting an aldehyde, a β-ketoester and ammonium bicarbonate in the presence of microwaves without a catalyst under solvent-free conditions. The method offers very attractive features such as reduced reaction times, higher yields and with no catalyst, when compared with any conventional method as well as with other catalysts, which will have wide scope in organic synthesis

3. Conclusion

1,4- Dihydropyridine derivatives was prepared by a condensation reaction of an aromatic aldehyde with ethylacetoacetate and ammonium acetate at 70˚C. It was characterized by melting point determination, TLC, solubility proflile , I.R ,NMR. The compound shows antibacterial , anti-inflammatory , analgesic , anticonvulsant and antioxidant activities.

4. Acknowledgement

The authors are very thankful to all teaching and non teaching staffs of Pushpagiri College of pharmacy , Thiruvalla, Kerala for providing all facilities to carry out this work .

References

[1] **PrasannaA.Datar** et.al, Design and synthesis of novel 4-substituted 1,4 – dihydropyridine derivatives as hypotensive agents, Journal Of Saudi Chemical Society, 2016, 20 , 510-516.
[2] **G.Swarnalatha** et.al ,1,4 – Dihydropyridines : A Multifunctional molecule –A Review , International Journal Of ChemTech Research , 2011,Vol 3 , 75-89.
[3] **Amit Pramanik** et.al,On-Water" Catalyst-Free Ecofriendly Synthesis ofthe Hantzsch Dihydropyridines , International Scholarly Research Network (ISRN),2012.
[4] **N.Srinivasa Rao** et.al ,Synthesis and antimicrobial activity of some 1,4-dihydropyridine derivatives, Scientific Reviews And Chemical Communications, 2013, 3 (3),141-149
[5] **Dr. V. Nirai** et.al,2012, Antimicrobial study (invitro) of some aryl 1,4-dihydropyridine derivatives, International Journal of Pharmacy and Pharmaceutical Sciences,2012 Vol 4, Issue 3
[6] **S. Indumathi**et.al, 2015,anticonvulsant, analgesic and anti-inflammatory activities of some novelpyrrole and 1,4-dihydropyridine derivatives, Journal of Chemical and Pharmaceutical Research, 2015, 7(2):434-440
[7] **Kumar**, *et al;*2012, Anticonvulsant activity of new Series of 1,4-dihydropyridine derivatives, Indian Journal of Pharmaceutical Sciences.
[8] **Asma samaunnisa** et.al;2013, Evaluation of 2,6-dimethyl-N3,N5- diphenyl-1,4-dihydropyridine-3,5-dicarbohydrazide derivatives for invivo anti-inflammatory and analgesic activities, International Research Journal of Pharmacy , 2013,4(9).
[9] **Ajit. K. Nangare** , et.al;2015, Synthesis and signification of 1,4-dihydropyridine analogs in different pharmaceutical drug, World Journal of Pharmaceutical Research ,2015 vol4,issue12, 738-749.