EDITORIAL

Recent Advancements in CNS Acting Drugs: A Step Towards End of Illness

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Abstract: Progressive degeneration in the morphology and functions of neuronal cells leads to multifactorial pathogenesis conditions of oxidative stress, mitochondrial dysfunction, excitotoxicity, nitric oxide toxicity, and neuro-inflammation to mediate heterogeneous types of neurodegenerative diseases, such as Epilepsy, Alzheimer's (AD) and Parkinson's (PD), more prominently among aging populations. In this editorial, complex mechanisms, challenges, and advancements made in the discovery of new neurotherapeutics, as well as designing approaches being adopted to fabricate brain-targeted delivery systems, are discussed.

1. INTRODUCTION

Most of the promising neurotherapeutics face inherent pharmaco-technical challenges related to CNS bioavailability, owing to the presence of the very restrictive and highly selective nature of the blood-brain barrier (BBB), which allows only a few molecules to reach brain compartments and their poor lipophilicity index [1]. Subsequently, if any fraction of such drugs can still manage to reach the brain, most of them are a substrate of efflux pumps, and these pumps treat them as noxious agents [2]. So, owing to the protective functions of these pumps, they ensure to extrude such fractions of drug out of CNS before reaching the actual site of drug targets [3]. Hence, Aslam et al. (2022) provided a detailed account of the process, mechanism, and significance of lipid-based nanocarriers for the targeted delivery of neurotherapeutic loads into a brain through BBB [4]. Whereas Jahangir et al. (2022) discussed the advantages of transdermal routes and delivery systems, which are not only non-invasive but also capable of effectively transporting topically applied CNS-acting nutraceuticals through the skin into the systemic circulation in a rate-controlled release manner and with the characteristic of bypassing hepatic first-pass metabolism [5]. Furthermore, Kumari et al. (2022) selected polyphenols as a model class of drug to justify their rationality, clinical evidence, potential as well as prospects of nano-formulations-based approaches for therapeutic management of neurodegenerative disorders [6]. While Ali et al. (2022) narrated a review that encompassed major impediments to the conventional approaches to the treatment of epilepsy and highlighted the significance of novel drug delivery systems to address these challenges [7]. Consequently, Rafiullah et al. (2022) discussed a detailed guideline based on a literature survey for the safer and more effective management of Diabetic Peripheral Neuropathy (DPN) using a different class of CNS-acting drugs as well as focused on integrating rationalized pharmaceutical combinations for treatment purposes [8]. Similarly, among neurodegenerative diseases, Alzheimer’s (AD), which is caused by the dysregulated accumulation of amyloid-β plaques and hyperphosphorylated neurofibrillary tangles, is the most devastating disorder, affecting memory loss and behavioural changes in millions of people worldwide [9]. Verma et al. (2022) provided an interesting insight into the role of AI (artificial intelligence) in the early diagnosis of AD by linking it with novel biomarkers as well as identifying potential targets of the drug to combat disease pathogenesis [10]. Based on the above outcomes, pyrazole and pyrimidine are emerging as promising neuroprotective scaffolds [11, 12]. Subsequently, the discovery of different drug targets eventually led to the reaching of some novel phytoconstituents and repurposed drugs into clinical trials [13]. Datusalia et al. (2022) reported that among them, repositioning of anti-allergic drug Montelukast (leukotriene receptor antagonist) as an anti-Alzheimer’s drug seems to be the most promising and potential approach to reducing leukotriene-mediated neuroinflammation [14].

CONCLUSION

In our brain, several factors affect the pathogenesis and progression of neurodegenerative disorders. Considerable efforts have been made toward designing novel neurotherapeutics as well as repurposing previously approved drugs for clinical management of disorders. However, to develop a successful therapeutic tool, there must be judicious integration of knowledge regarding physicochemical properties of drugs, their mechanism of actions, as well as intricated links with nanotechnology integrated approaches for clinically effective and safer alternatives for long-term usage.

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