

The Use and Importance of Artificial Intelligence in the Diagnosis and Management of Diabetes Related Peripheral Neuropathy

Mridula Chauhan

Assistant Professor, Department of Physiotherapy, Career Point University, Kota, India

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ABSTRACT

Diabetic patients often developed acute and chronic complications if left unmonitored. They need constant medical observation as well as guidance regarding the early diagnosis as well as timely management of the complications. With the advancement in the field of artificial intelligence a multidimensional range of researches has been conducting in order to support the health care system as well in the treatment of diabetes by early identification of complication at a prior stage and not leading to advancing it into chronic complications like Diabetic Peripheral Neuropathy.

Diabetes Mellitus has many chronic complications including Diabetes neuropathy, causing adverse effect on peripheral nervous system with consequences of increase in the incidences of fall as well as socioeconomic burden.

The boom of Artificial intelligence (AI) has given us high hopes in the scope in the field of management of diabetes. It is a fast-developing area in the field of health care system as well as implications on the diabetic patients. The aim of this article is to find out the use and importance of artificial intelligence in the diagnosis as well as management of diabetes related complications affecting peripheral nervous system.

Keywords: Artificial Intelligence, Diabetes Mellitus, Diabetes related peripheral Neuropathy, Diabetic Patients, Health Care

INTRODUCTION

Diabetes Mellitus has many chronic complications including Diabetes neuropathy, causing adverse effect on peripheral nervous system with consequences of increase in the incidences of fall as well as socioeconomic burden.

The boom of Artificial intelligence (AI) has given us high hopes in the scope in the field of management of diabetes. It is a fast-developing area in the field of health care system as well as implications on the diabetic patients. The aim of this article is to find out the use and importance of artificial intelligence in the diagnosis as well as management of diabetes related complications affecting peripheral nervous system.

Diabetic neuropathy (DN) is a common disorder and is defined as signs and symptoms of peripheral nerve dysfunction in a patient with diabetes mellitus (DM) in whom other causes of peripheral nerve dysfunction have been excluded¹.

The prevalence of neuropathy is 8–45% in those with type 2 diabetes, with about a quarter of patients experiencing pain².

AI based technologies, such as machine learning, data mining, Convolutional neural network (CNN), Random Forest, Fuzzy logic/fuzzy system, Support vector machine (SVM), Logistic regression, Natural language processing, Multilayer perceptron have been increasingly integrated with medical screening of diabetes and are

gradually becoming important drivers of medical development^{3,9}.

In many cases of diabetes with on time diagnosis and the awareness of the patients in self-management, regular health care and monitoring play a significant role to limit or delay the complications as well control of hyperglycaemia to intercept acute complications (Diabetic ketoacidosis) and limit the probability of long-term complications (e.g., retinopathy, Diabetes foot, heart attacks and strokes, nephropathy, neuropathy, CVD)⁴.

AI TECHNOLOGY IN THE DIAGNOSIS OF DIABETIC NEUROPATHY

AI technology has the potential to evaluate large amounts of data and identify the patterns that may not be accessible easily. This leads to the development of prognostic models which can filter out the patients who are at greater risk of developing diabetic neuropathy. They can also be used to anticipate the advancement of the disease, recognizing for prompt intervention and better outcomes. There are various AI-/ML-based medical devices available in the area of diabetes such as automatic retinal screening, in clinical diagnosis, and patient self-management tool which have already been backed by the US Food and Drug Administration⁵.

AI TECNOLOGY IN THE MANAGEMENT OF DIABETIC NEUROPATHY

Apart from the diagnosis AI has been applied in the advanced treatment strategies in diabetic neuropathy. AI is playing promising role in the analysis of genetic and molecular data to find out the probable selected drug, and to find out the effectiveness of latest treatments prior to the clinical trials. It will fasten the drug research procedure as well in the reduction of the expenditure value in the development of the drug.

In addition, technology of Artificial Intelligence has been used to evolve

wearable devices that can scan blood glucose levels and other vital parameters in the real-time. These AI based devices can give interpretation to the patients and healthcare givers and allow them the early identification of complications like diabetic neuropathy.

It has also been used to develop a decision support systems A clinical decision support system (CDSS) is intended to improve healthcare delivery by enhancing medical decisions with targeted clinical knowledge, patient information, and other health information that can assist healthcare providers in the management of diabetes neuropathy^{6,7}. These systems can provide personalized treatment recommendations based on a patient's medical history and current symptoms. This can lead to more efficient and effective treatment, reducing the burden on healthcare providers and improving patient outcomes.

MATERIALS & METHODS

An illustrative literature review is done by focusing on the diagnosis of Diabetic peripheral neuropathy by artificial intelligence, hyperglycaemia, Diabetic neuropathy etc. Relevant articles were searched from PubMed, Cochrane library, google scholar, Scopus and the references of the searched articles were also included

CONCLUSION

The implementation of Artificial Intelligence has the probability to transform the diagnosis and management of the diabetes in a simpler manner for the affected patient as well its complication such as Diabetic neuropathy, with the identification of suspected high-risk patients by finding out the prognosis of the disease, and developing advanced treatment approaches and protocols. It will improve the outcome of the treatment with the reduction of healthcare costs. There is a long way to go in the field of research centred on AI, with continuous advancement in Research and Development the complete role of AI in diabetic neuropathy may soon found out

soon.

Declaration by Authors

Ethical Approval: Not Applicable

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