

# Role of artificial intelligence and Machine learning in musculoskeletal physiotherapy

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## Abstract

Artificial intelligence is the intelligence demonstrated by machines. It mimics human intelligence and is of great help in many fields, specially medicine. Physiotherapy as a speciality is involved in curing traumatic bony injuries and pain. In physiotherapy artificial intelligence could be one of the most important modality in delivering better health services to needy people, by providing users with a digitalized system for physiotherapy.

**Purpose:** The purpose of the review is to evaluate whether Artificial intelligence and machine learning when used as tools in musculoskeletal physiotherapy will aid the physiotherapist in better patient outcome and provide the physiotherapist with advanced tools in treating patients and reduce their workloads. It will also help to prepare themselves with the knowledge of these modern tools, which they can impart on their students.

**Keywords:** artificial intelligence, machine learning, musculoskeletal, physiotherapy.

## INTRODUCTION

Artificial intelligence and machine learning are one of the most promising and thriving areas of innovation in healthcare. Artificial intelligence is a cross disciplinary field of research that attempts to replicate intelligence and cognitive processes by using mathematical and biological principles and devices.(1)The demand for physiotherapy increasing than ever before as the pace of debilitated people rises due to sedentary and unhealthy lifestyle of people the physiotherapist works with other health professionals and benefit people by avoiding surgery,improving mobility and manage age associated illnesses innovation in the field of medication has well demonstrated advantages,artificial intelligence and machine learning a can be used as tools in decreasing the workloads of the therapists and providing them means to treat more patients efficiently.(1-10)These tools will helps to reduce the workload on physiotherapists and allow them to treat more patients.

Musculoskeletal conditions are increasing and major causes of pain along with disability and increase in expenses of healthcare. With the help of artificial intelligence and machine learning physiotherapist can give the kind of care and support which is required by the patient. With this tools the patient can do physiotherapy at home. Health outcomes are better when a person is surrounded by people with whom they are connected. Thus artificial intelligence use in physiotherapy can aid in improved patient outcome and will also reduce the load of physiotherapists.

Artificial intelligence:

Artificial intelligence can be equated as a branch of mathematics that describes a computers ability to perform tasks that normally requires human intelligence. It can be defined as technology development used to perform technological operations requiring involvement of human intelligence, machine learning is a key component of artificial intelligence and provides with

the ability of both supervised and unsupervised learning for training our model.(11-18) Artificial intelligence can be used in different forms such as software programmes and hardware interface.

Artificial intelligence and medical science:

Artificial intelligence based research guides in clinical decision-making with the use of expert systems the computer vision algorithms can outperform human beings in analysis of muscular skeletal images providing better patient outcomes based system uses multiple layers of information and algorithms and improve clinical decision making, the present medical artificial intelligence systems need to be evaluated for its advantages insufficiencies and to design systems that can lead to improved treatments.

Artificial intelligence in musculoskeletal physiotherapy:

In the recent era access to technical education across our workplace has become exceedingly necessary. With artificial intelligence the physiotherapist can endure learning with customized modules with which they can practice whenever they need to. (19-25)The speed of artificial intelligence adoption in different health care sectors will rapidly outpace the retirement of physiotherapist so in order to perform effectively. Physiotherapist must interact and work with artificial intelligence work program. So we must develop better frameworks for continuing professional growth. This will aid them with the skills that are exceptionally essential for professional practice in an era of artificial intelligence the physiotherapist must have knowledge data literacy,technical literacy,and human literacy. (26-28)The data literacy will help to read, analyse and use large data sets. Technical literacy help them to acquire the knowledge to interact with machines finally when the robots take the role of humans, we may need human literacy which is outside the reach of machine learning system.

The success of machine learning depends on the accuracy and amount of data available to teach the systems. Predictive modeling in ML predicts an event based on the available data.it can be a useful tool in providing immediate care of patients in certain conditions. “Stroke recovery predictor” is one such application developed by an Indian physiotherapist to predict the extent of recovery of stroke patients based on the duration of hospital stay,duration of stroke and barthel index etc. This can be of great help in guiding rehabilitation process.

One more useful application of artificial intelligence with machine learning in assessment of patients based on posture detection with use of open pose. Open pose is an open source library developed in C++ for the posture detection. It is used by importing open pose and later image is passed as Numpy matrices which is then converted to human key points. It is combination of caffe,openCV and openCL which is used in different fields such as hand gesture detection, basketball games for prediction of basket throw and various other sports activities. It is also easier to use because of its capability to replace methods which involve high cost along with more equipment and time for processing. (5)

AI and ML will limit the use of personal physiotherapists to look after the patient and teach exercises. Physera an online application provides patients with excellent physiotherapists. Sword health is a digitalized physiotherapy solution, where digital physiotherapists are available to check patient’s motion and provide exercises. Patients can stay at home and learn this exercises. Physitrack provides home solutions to patients in areas such as orthopedics and neurology. Vera health-Family doctor clinic provides services in vera care, vera wellness, vera physio etc.It is an offline rehabilitation that monitors patients.(29-30)

## Conclusion

The artificial intelligence technologies and machine learning in physiotherapy are constantly pushing for improvements that would impact their role in the 21st century. The educators of physiotherapy must strive to provide the future physiotherapist what the smart machines cannot which may include Practicing wisdom, personal learning pathway and an emotional bonding with students as part of teaching and learning.

While artificial intelligence based systems may take over the tasks of managing the learning process the educators will still need to help the students in achieving their goals and support and motivate them.

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