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EXPLORING KNOWLEDGE, AWARENESS AND PERCEPTION OF CLINICAL PHYSICAL THERAPIST TOWARD ARTIFICIAL INTELLIGENCE APPLICATION IN PHYSICAL THERAPY AND REHABILITATION

Fida Hussain[1*], Wareesha Mahmood[2], Malika Afzal[3], Dr. Abdul Jalal khan PT[4], Fazal Rehman[5], Saleem Malik[6], Hassan Khan[7], Ikramullah[8], Dr. Sardar Alam[9], Danish Mehmood[10], Dr. Akbar Alam[11],

[1*]Fida.hussain@cusit.edu.pk, Lecturer Department of Allied Health Sciences City University of Science and Information Technology Peshawar, Pakistan
[2]Wareeshamahmood90@gmail.com, Department of Allied Health Sciences City University of Science and Information Technology Peshawar, Pakistan
2malikaafzal157@gmail.com, Department of Allied Health Sciences City University of Science and Information Technology Peshawar, Pakistan
3jalalkhanncs1@gmail.com, Peads Physiotherapist Al Sondos Rehabilitation Centre for People of Determination,Al-Azrah Sharjah, UAE
4drfazal.kth@gmail.com, Physical Therapist Department of Physical therapy, Khyber Teaching Hospital MTI-KTH Peshawar, Pakistan
5Saleemmalik3376@yahoo.com, Institute of Physical Medicine and Rehabilitation, Khyber Medical University Peshawar, Pakistan
6hasan.khan@cusit.edu.pk Clinical Demonstrator Department of Allied Health Sciences City University of Science and Information Technology Peshawar, Pakistan
7shanglatiger@gmail.com, Registered Nurse Burn and Plastic Surgery Center Peshawar, Pakistan
8Sardarlam1186@gmail.com,Registrar Gastroenterology Unit Mardan Medical Complex Mardan, Pakistan
9danish_airborne@yahoo.com, Senior Lecturer, NCS Physical Medicine and Rehabilitation College Peshawar, Pakistan
[10]akbaralamswt997@gmail.com, House officer, Kohat Institute of Dental Sciences Khyber Medical University Kohat, Pakistan

[*]Corresponding Author: Fida Hussain
Fida.hussain@cusit.edu.pk, Lecturer Department of Allied Health Sciences City University of Science and Information Technology Peshawar, Pakistan

Abstract:
Objectives: The study aimed to explore the knowledge, awareness and perception of Clinical Physical Therapist toward Artificial Intelligence application in Physical therapy and rehabilitation.

Methods: Cross-sectional study was performed by distributing 5-point likert scale questionnaire among 117 physical therapists in Tertiary care hospitals in Peshawar.
Results: On the basis of gender male physical therapist (49.15%), (54.23%) and (28.81%) have more knowledge as compare to female Physical therapist (18.96%), (18.96%) and (6.89). Males (27.1%), (28.81%) and (47.45%) were also aware more about AI applications then female (18.96%), (32.75%) and (17.24%). Increases knowledge and awareness amone also have high perception. On the basis of age categories 30-40years physical therapist have more knowledge and awareness than 20-30 years and 40-50years of physical Therapist also perception at different age categories were differ.
Conclusion: AI is flattering further predominant and leading in clinical or health care and rehabilitation settings as an instrument or device it progress training patterns and patient conclusions. So, it is concluded on the basis of responses of clinical physiotherapist to the questionnaire that physical therapist have knowledge and awareness of artificial intelligence applications in field of physiotherapy and they have the perception if it is integrated in the field it can bring positive outcomes in management of patient condition.

Keywords: Artificial Intelligence,Awareness, Knowledge,Perception, Physical therapist, Rehabilitation

Introduction

Artificial intelligence (AI) can make anyone life easy, safe and way more comfortable by helping them do their task more accurately and quickly (Huang & Wang, 2022). AI can be defined the ability or capability of a machine to accomplish a purposeful task moderated intelligently as the humans **(**Luna et al., 2021**).** Artificial intelligence holds the capacity it is used actually to generate programs to reproduce and mimic multifaceted cognitive chores to contribute clinical Physical Therapist in patient management and protocol (Hamet & Tremblay, 2017).

Furthermore, artificial intelligence based robots can be considered beneficial in the assessment of changes in human performance in such conditions as rehabilitation (Malik, Pathania, & Rathaur, 2019). In healthcare and rehabilitation artificial intelligence had been characterized into two subtypes that are virtual and physical. The part that consists of robots helping in performing different medical surgeries, intelligence-based prostheses for patients who are handicapped, also elderly care to help prevent and reduce risk of fall is basically the physical one. On the other hand the virtual part encompasses an application that is electronic health record structures to neural network-based management in treatment choices (Tack, 2019).

Artificial intelligence technologies now more widespread so, the necessity for AI knowledge among Physical Therapists becomes important. Assuming the fact that artificial intelligence technologies may achieve some of the Physical Therapists' work, now it is essential for us to immediately investigate Physical Therapist perception and preparation for consuming these advanced artificial intelligence based technologies (Castagno & Khalifa, 2020).

Regarding awareness about artificial intelligence, there are many of the healthcare worker and physical therapist out there who might be aware about artificial intelligence application and utilize it on daily bases if we can take examples then the best one will be the use of Apple Watch continuously that measures different information related to health of that user. That user's health material includes heart rate, oxygen saturation level and refers the data to the user's health services provider (Asan & Choudhury, 2021).

Speaking about perception towards Artificial intelligence we can say that the perception of Physical Therapist community is starting to comprehend the importance of Artificial intelligence to fundamentally improve patient care although Artificial intelligence-based applications are still not that much or not at all we can say integrated in healthcare and rehabilitation as fast as the technology has been proceeding. So, this discordance might be the due to resistance of Physical Therapist and other healthcare staffs to admit and apply tools that staffs do not really comprehend that much, and in some belongings straight distress, and might turn out being very expensive designed for daily care in

rehabilitation. As a problem of statement, the Artificial intelligence importance is to changed costs, recover treatment and rise availability to healthcare is predictable to be extremely gratifying (Zhang, Li-Tsang, & Au, 2017). Furthermore, it can be stated that Artificial intelligence is able to detect anonstandard movement patterns during functional movements of the patient (Pattanshetty & Khan, 2022). In 2011, the first mechanical leg through automation, whereas Ottoock shown the Genium X3 which allowed converse Walking and provide easy and accessible mobility all through the gait training of the patient (Patel et al., 2021).

There are certain and important application given below that are Artificial intelligence based which help the treatment and management of patient condition that are Apple Watch observing tremors and arrhythmia with no other symptoms; EpiFinder application assist in recognizing seizure attacks natures and epilepsy syndromes severity. A fresh perspective now emerging in neurological field in the form of artificial intelligence application and instruments, assisting patients in the improvement of their prognosis (Ileșan et al., 2022).

NIMBLE is biosensor patches that are wearable, constituted of an accelerometer along with an electromyography (EMG) antenna, for motorized estimation for Parkinson Disease. Move sense antenna and a Forciot pad to perceive ambulatory configurations in Parkinson Disease. BioKin strategies to evaluate everyday assignments: indicating, bucketing, ambulatory, and mobile about stool or table (Liu et al., 2021). Myoelectric signs (MES) confine annoying evidence from which a person objective in the form of a muscular shriveling can be perceived, consuming medical equipment (Yip et al., 2023).

AI utilized in rehabilitation devices and advanced prosthetics can deliver individualized support, as well as recover functionality and mobility (Rigby, 2019).

AI instruments similarly spread hooked on the physical territory with machinelike prostheses, physical task provision systems, and mobile wheeler-dealers supporting in the distribution of telemedicine (Kyrarini et al., 2021).The first exoskeleton is Rewalk and gets FDA authorization for expenditure inside the United States. Lokomat is automaton considered by Hocoma to preservation complete body weight. Patients can practice it irrespective of their upper boundary control. Lokomat, two-sided orthosis automaton. (Zhou, Yang, & Xue, 2021).

GRERs (Gait rehabilitation exoskeleton robots (GRERs) is appropriate for patients with uncharacteristic gait pattern or multiparty pattern as it can contribute patients to comprehensive ambulatory in a standard gait and offer power for them (Asan & Choudhury, 2021) .There are many other Artificial intelligence applications usage in health care and rehabilitation therefore, this study is conducted to explore knowledge, awareness and perception of clinical Physical therapist toward Artificial intelligence application in physiotherapy and rehabilitation.

Methodology:

Study design and setting:

This study design has used a cross sectional study, we have collected data from diverse sample of Physical therapist at a single point in time giving a brief idea of a population, characteristics and behaviours. This research study was performed in tertiary care hospitals both Government and private in Peshawar after taking consultation from physical therapy Department.

Sample size

This research participants were clinical physical therapist have different age groups, both male and female from different tertiary care hospital Peshawar. This is achieved with the use of Rao soft Software to arrive at the supposed sample size of 117 at the 95% confidence interval to ensure the identification of good valid data for the variables under analysis.

Sampling technique:

Non probability convenient sampling was used due to its effectiveness: this means that the subjects of the study are chosen conditional on the researchers' opportunity of having admittance to them.

Study tool

We collected the data through 5 point likert self-modified questionnaire. The first section consist of demographics (Name, Age, Gender and hospital name), second section is about knowledge that consist of 3 question, third section have also 3 question that is about awareness and last portion is about perception that have 4 question.

Data collection technique

After obtaining proper approval, a full explanation of the study objectives was communicated to them and the questionnaires were manually distributed to the participants (clinical PT) by using convenience sampling method.

Data analysis

Data was statistically analyses through SPSS and excel.

Ethical consideration:

The research was conducted by the ethical approval from City University of Science and information technology of Peshawar.

Results

Out of sample size of 117, 59 (50.4%) were male while 58 (49.6%) were females all of them have given the data.

Table 1: Gender frequencies and percentage

	Frequency values	**Percent**
Male	59	50.4 %
Female	58	49.6%
Total	117	100.0%

Table 2: Tabulation for knowledge, awareness and perception on Gender basis

	Strongly agree	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**	
For Males:						
Knowledge about AI	7 (11.86%)	29 (49.15%)	14 (23.72%)	4 (6.77%)	5 (8.47%)	59
Use of AI tools in practice	3 (5.0%)	32 (54.23%)	16 (27.11%)	4(6.77%)	4 (6.77%)	59
AI Enhance effectiveness in PT	14 (23.72%)	17 (28.81%)	19 (32.20%)	6 (10.16%)	3 (5.0%)	59
For females:						
Knowledge about AI	6 (10.16%)	11 (18.96%)	16 (27.58%)	21 (35.20%)	4(6.89%)	58
Use of AI tools in practice	7(12.06%)	11 (18.96%)	16(27.58%%)	22 (37.20%)	2 (3.44%)	58
AI Enhance effectiveness in PT	0	4(6.89%)	22 (37.93%)	27 (45.76%)	5(8.62%)	58
For awareness						

For Males:						
Privacy issues with uses of AI applications	6 (10.16%)	16 (27.11%)	30 (50.84%)	6 (10.16%)	1 (1.69%)	59
AI replace Physical therapist	0	17 (28.81%)	23 (38.98%)	12 (20.33%)	7(11.86%)	59
Accommodate AI in patient Rehab	1 (1.69%)	28 (47.45%)	25 (42.37%)	4(6.77%)	1 (1.69%)	59
For Females:						
Privacy issues with uses of AI applications	1 (1.72%)	11 (18.96%)	24 (41.37%)	13 (22.41%)	9 (15.51%)	58
AI replace Physical therapist	11 (18.96%)	19 (32.75%)	19 (32.75%)	11 (18.96%)	0	58
Accommodate AI in patient Rehab	2 (3.44%)	10 (17.24%)	21(36.20%)	21(36.20%)	4(6.89%)	58
For perception						
For Males:						
AI support development in clinical PT	3 (5.08%)	29 (49.15%)	20 (33.89%)	6 (10.16%)	1 (1.69%)	59
Use of AI impact career	3 (5.08%)	23 (38.98%)	28 (47.45%)	4(6.77%)	1 (1.69%)	59
Feel hopeful by having AI	7(11.86%)	27 (45.76%)	21 (35.59%)	3 (5.08%)	1 (1.69%)	59
AI and Ethical consideration	1 (1.69%%)	22 (37.28%)	26 (44.06%)	10 (16.94)	0	59
For Females						
AI support development in clinical PT	1 (1.72%)	9(15.51%)	18 (31.03%)	27 (46.55%)	3 (5.17%)	58
Use of AI impact career	5 (8.62%)	10 (12.24%)	21 (36.20%)	19 (32.75%)	3(5.17%)	58
Feel hopeful by having AI	1 (1.72%)	5(8.62%)	24 (41.37%)	26 (44.82%)	2 (3.44%)	58
AI and Ethical consideration	2(3.44%)	9 (15.51%)	30 (51.72%)	15 (25.86%)	2(3.44%)	58

From table 2, knowledge about AI 29(49.15%)/ 59 (100%) are agree and 7 (11.86%) strongly agree it represents, male has more knowledge as compare to female that show 11(18.96%) agree and 6(10.16%) strongly agree out of 58. for use of AI tools in practice male (54.23%) have more knowledge as compare to female (18.96%). Knowledge about AI enhance effectiveness in Physical

therapy male have more knowledge and agree (28.81%) as compare to female (6.89%). Awareness about AI, privacy issues with the use of AI tools 16(27.11)/59males aware and agree it represents, male has more aware as compare to female that show 11(18.96%) agree and 9(15.51%) females are disagreed about it. AI tools in practice replace Physical therapist 23(38.98%) males have neutral response as compare to his 17 (28.81%) are agree but 19 (32.75%) females are agreed. To accommodate AI in patient Rehab mostly male 28(47.45%) are aware and agree as compare to female 10 (17.24%). Perception about AI, for AI support development in clinical Physical therapy 29(49.15%)/59males have perception about it, represents, male has more agree as compare to female that show 9(15.51%) agree.AI tools use in practice impact career the perception of male about this statement is that 23(38.98%) males agreed to this and 10 (12.24%) females are agreed. Male physical therapist 27 (45.76%) feel more hopeful by having AI as compare to female 5(8.62%). Ethical consideration regarding AI application in field 22(37.28) male accept this and agree and 9 (15.41%) females have perception about it. From the above result it is concluded that males have more knowledge, awareness and perception in every about Artificial intelligence application in physical therapy and rehabilitation as compare to females. Out of 117 Physical therapist between age 20-30years 95(81.19%), between 30-40 years 20(17.09%) and between 40-50years 2(1.7%).

Table 3 Tabulation for Age categories

Age Categories	Frequency	Percent
20-30years	95	81.19%
30-40years	20	17.09%
40-50years	2	1.7%
Total	117	100.0%

Table 4 Tabulation for knowledge, awareness and perception on Age category basis

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total
20-30years						
Knowledge about AI	9 (9.47%)	36 (37.89%)	27 (28.42%)	14 (14.7%)	9 (9.47%)	95
Use of AI tools in practice	5 (5.26%)	37 (38.94%)	31 (32.63%)	11(11.57%)	11(11.57%)	95
AI Enhance effectiveness in PT	13 (13.68%)	34 (35.78%)	37 (38.94%)	10 (10.52%)	1 (1.05%)	95
30-40years						
Knowledge about AI	1 (5%)	14 (70%)	2 (10%)	1(5%)	2 (10%)	20
Use of AI tools in practice	0	16 (80%)	1(5%)	2 (10%)	1(5%)	20
AI Enhance effectiveness in PT	4 (20%)	7(35%)	6 (30%)	3 (15%)	0	20
40-50 years						
Knowledge about AI	1 (50%)	0	1 (50%)	0	0	2
Use of AI tools in practice	0	1 (50%)	1(50%)	0	0	2
AI Enhance effectiveness in PT	0	2(100%)	0	0	0	2
for awareness on age basis						
20-30years						
Privacy issues with the use of AI application	11(11.57%)	21(22.10%)	48(50.52%)	14(14.73%)	1(1.05%)	95
AI replace physical therapist	0	25 (26.31%)	30 (31.57%)	22(23.15%)	18(18.94%)	95
Accommodate AI in patient rehab	6(6.31%)	37(38.94%)	38(40%)	12(12.63%)	2(2.10%)	95
30-40 years						
Privacy issues with the use of AI	4(20%)	7(35%)	6(30%)	3(15%)	0	20

AI replace physical therapist	0	12(60%)	6(30%)	2(19%)	0	20
Accommodate AI in patient rehab	1(5%)	11(55%)	5(25%)	3(15%)	0	20
40-50year						
Privacy issues with the use of AI application	0	2(100%)	1(50%)	0	0	2
AI replace physical therapist	0	0	1(50%)	1(50%)	0	2
Accommodate AI in patient rehab	0	1(50%)	1(50%)	0	0	2
For perception						
20-30yearss						
AI support development in clinical PT	5(5.26%)	45(47.36%)	31(32.63%)	11(11.57%)	3(3.15%)	95
Use of AI impact career	5(5.26%)	37(38.94%)	37(38.94%)	11(11.57%)	5(5.26%)	95
Feel hopeful by having AI	5(5.26%)	41(43.15%)	39(41.05%)	8(8.42%)	2(2.10%)	95
AI and ethical consideration	2(2.10%)	30(31.57%)	49(51.57%)	12(12.63%)	2(2.10%)	95
30-40 years						
AI support development in clinical PT	1(5%)	11(55%)	5(25%)	3(15%)	0	20
Use of AI impact career	1(5%)	4(20%)	11(55%)	3(15%)	1(5%)	20
Feel hopeful by having AI	4(20%)	11(55%)	5(25%)	0	0	20
AI and ethical consideration	0	7(35%)	7(35%)	6(30%)	0	20
40-50 years						
AI support development in clinical PT	0	1(50%)	1(50%)	0	0	2
Use of AI impact career	0	0	1(50%)	1(50%)	0	2
Feel hopeful by having AI	0	1(50%)	1(50%)	0	0	2
AI and ethical consideration	0	0	1(50%)	1(50%)	0	2

Knowledge about AI shown that 20-30 years of PT have more agree and have good knowledge 36 (37.89%)/95 as compare to other categories. Between 30-40years 14 (70%)/20 and 40-50years 1 (50%)/2 agreed. Use of AI in practice, knowledge of 30-40years of PT 16 (80%)/20 agreed but 20-30 years of PT 37 (38.94%)/95 agreed, for third category 1(50%)/2 agreed.AI enhance effectiveness Physical therapy, 40-50years of category have 2(100%)/2 agreed about it then 20- 30 years PT 34 (35.78%)/95 and 30-40years 7 (35%)/20 have knowledge.

For awareness portion, privacy issues with the uses of AI application 20-30 years of Physical therapist 21 (22.10%)/95,30-40 years of Physical therapist 7 (35%)/20 and 40-50 years of Physical Therapist 2(100%)/2 agreed and aware about privacy issues regarding AI application uses in Practice. Awareness about AI replace Physical Therapist in Clinical Settings 20-30 years of age category 25 (26.31%)/95 agreed and aware more as compare to 30-40 years of category 12 (60%)/20 and 40-50 years (0). To accommodate AI in patient Rehab11(55%)/20 of 30-40years physical therapist are aware as compare to 20-30 years37 (38.94%)/95 and 40-50 years 1 (50%)

Perception about AI support development in clinical Physical therapy,30-40years 11(55%)/20 physical therapist agreed 20-30years 45 (47.36%)/95 agreed and 1(50%)/2 40=50years Physical therapist are agreed. The perception about the use of AI impact career 37 (38.94%)/95, 4(20%) and 0/2 physical therapist agreed. 30-40 years of 11(55%)/20 Physical therapist feel more hopeful by having AI in their field as compare to 41(43.15%)/95 20-30 years physical therapist and 1(50%)/2 40-

50 years of physical therapist. AI and ethical consideration the 7(35%)/20 physical therapist have agreed to this and 30 (31.57%)/95 agreed and 1(50%)/2 disagree according to their age categories. The results are concluded on the basis of gender and age categories.

Discussion

From tertiary care hospitals Physical therapist participated in fulfilling the questionnaire which included both male and female. Among those Physical therapists that is out of sample size of 117, 59 (50.4%) were male while 58 (49.6%) were female. Physical therapist between age 20- 30years 95(81.19%), between 30-40 years 20(17.09%) and between 40-50years 2(1.7%). By using questionnaire (5=point Likert scale) the data is collected in the form of survey from tertiary care hospitals in Peshawar.

The physical therapist in those hospitals are included, Maqsood Medical complex Peshawar, Hayat Abad medical complex Peshawar, Khyber teaching hospital, City hospital Peshawar ,Northwest general hospital Peshawar, Peshawar general hospital, PIMS hospital Peshawar, Kuwait teaching hospital Peshawar, Prime hospital Peshawar, Naseer Ullah khan Baber memorial hospital Peshawar, Afridi medial complex Peshawar, Naseer teaching hospital Peshawar, Peshawar institute of cardiology, Rehman medical Institute Peshawar .The 5-point Likert scale is having 5-point as an option to the question. From the above result it is concluded that males have more knowledge, awareness and perception about Artificial intelligence application in physical therapy and rehabilitation as compare to females.

A study by Teng et .al 2022 conducted to find out knowledge and perspective of healthcare students on Artificial intelligence application. The design of this study was cross sectional study. The sample size was 2947. The tool used in this study was Likert scale. The study concluded that 74.5 % of students have education about this topic and integration of Artificial intelligence is need in their field. Its mean this study supports the current study that is 29 (49.15%) male and 11 (18.96%) female have knowledge, awareness's and perception of Physical therapist toward Artificial intelligence application in physiotherapy and rehabilitation (Teng et al., 2022).

A study by Alsobhi 2022 conducted to access physical therapist knowledge and attitude regarding Artificial intelligence in health care and rehabilitation. The design of study was Cross sectional study. The sample size was 317. The tool used in this study is 5-point Likert scale. The study concluded that 121 (38.2%) Physical therapist have knowledge about Artificial intelligence but the current study shows that there is more knowledge awareness and perception of Clinical physical therapist toward Artificial intelligence application in physiotherapy and rehabilitation 49.15% male and 18.97% female (Alsobhi et al., 2022).

Conclusion

Artificial intelligence is flattering further predominant and leading in clinical or health care and rehabilitation settings as an instrument or device its progress training patterns and patient conclusions. It is concluded on the basis of responses of clinical physiotherapist to the questionnaire that physical therapist has knowledge and awareness of artificial intelligence applications in the field of physiotherapy. On the basis of gender male physical therapist (49.15%), (54.23%) and (28.81%) have more knowledge as compare to female Physical therapist (18.96%), (18.96%) and (6.89). Males (27.1%), (28.81%) and (47.45%) were also aware more about AI applications then female (18.96%), (32.75%) and (17.24%). Increases knowledge and awareness among male also have high perception. On the basis of age categories 30-40years physical therapist have more knowledge and awareness than 20-30 years and 40-50years of physical Therapist also perception at different age categories were differ. Artificial intelligence is flattering further predominant and leading in clinical or health care and rehabilitation settings as an instrument or device its progress training patterns and patient conclusions

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