CLINICAL RESEARCH / KLİNİK ARAŞTIRMA

ANATOLIAN
JOURNAL of GENERAL MEDICAL RESEARCH

Knowledge and Approaches to Family Medicine Assistants' Artificial Intelligence

Aile Hekimliği Asistanlarının Yapay Zekaya İlişkin Bilgi ve Yaklaşımları

🄳 **İsmail Çifçi**[1], 🄳 **Esra Meltem Koç**[2]

[1]Turkish Ministry of Health, Karabağlar 27th Family Medicine Centre, İzmir, Turkey
[2]İzmir Katip Çelebi University Faculty of Medicine, Department of Family Medicine, İzmir, Turkey

Cite as: Çifçi İ, Koç EM. Knowledge and Approaches to Family Medicine Assistants' Artificial Intelligence. Anatol J Gen Med Res. 2024;34(3):285-91

Abstract

Objective: The aim of this study was to determine the areas of use of artificial intelligence (AI) by family medicine assistants and to evaluate their knowledge and approaches to the use of AI in the field of health.

Methods: This study was designed as a descriptive research. The participants were family medicine residents in 4 university hospitals in İzmir province. Data were collected using an online questionnaire prepared by the researchers. The questionnaire included preliminary information about the participants' use of AI as well as various sections aiming to evaluate their approaches towards AI in the field of health.

Results: A total of 204 participants, 108 (52.9%) female and 96 (47.1%) male, were included in the study. While 64.7% (n=132) of the participants defined themselves as having basic knowledge about AI, 69.1% (n=141) had knowledge about the use of AI in the field of medical imaging. While 85.3% (n=174) of the participants wanted to have AI applications courses in specialty education, only 35.3% (n=72) found AI reliable. 98.5% (n=201) of the participants thought that AI could keep records like a physician, 75% (n=153) thought that it could analyze disease prognosis, 97.1% (n=198) thought that the time taken for diagnosis would be shortened with the use of AI, and 80.9% (n=165) thought that treatment costs would be reduced.

Conclusion: AI is a development that will play a more active role in healthcare, especially in primary care, in the future. Many participants believed AI could perform certain health services like a physician, would have positive effects in various areas, and wanted AI included in health courses in specialty education. Therefore, increasing the knowledge level of family medicine assistants through AI training will contribute to the delivery of health services.

Keywords: Artificial intelligence, family medicine, education, telemedicine, digital health

Öz

Amaç: Bu çalışmanın amacı, aile hekimliği asistanlarının yapay zeka kullanım alanlarını tespit etmek ve yapay zekanın sağlık alanında kullanımı ile bilgi ve yaklaşımlarını değerlendirmektir.

Yöntem: Bu çalışma tanımlayıcı tipte araştırma olarak tasarlandı. Katılımcıları İzmir ilindeki 4 üniversite hastanesinde aile hekimliği eğitimi alan asistanlar oluşturdu. Veriler online yöntemle araştırmacılar tarafından hazırlanmış anket kullanılarak toplanmıştır. Anket katılımcıların yapay zeka kullanımları ile ilgili ön bilgilerin yanı sıra sağlık alanında yapay zekaya yönelik yaklaşımlarını değerlendirmeyi amaçlayan çeşitli bölümleri içeriyordu.

Bulgular: Araştırmaya 108'i (%52,9) kadın, 96'sı (%47,1) erkek olmak üzere toplam 204 katılımcı dahil edildi. Katılımcıların %64,7'si (n=132) yapay zeka özelinde kendini temel düzeyde bilgi sahibi olarak tanımlarken, %69,1'i (n=141) tıbbi görüntüleme alanında yapay zeka kullanımı ile ilgili bilgiye sahipti. Katılımcıların %85,3'ü (n=174) uzmanlık eğitiminde yapay zeka uygulamaları dersleri olmasını isterken sadece %35,3'ü (n=72) yapay zekayı güvenilir buluyordu. Katılımcıların

Öz

%98,5'i (n=201) yapay zekanın bir hekim gibi kayıt tutabileceğini, %75'i (n=153) hastalık prognozu analiz edebileceğini düşünüyor, %97,1'i (n=198) yapay zeka kullanımı ile teşhis için geçen sürede kısalma olacağını, %80,9'u (n=165) tedavi maliyetlerinde azalma olacağını düşünüyordu.

Sonuç: Yapay zeka gelecekte sağlık alanında ve özellikle birinci basamakta daha aktif yer bulacak gelişmelerden biridir. Katılımcıların önemli bir kısmı yapay zekanın bazı sağlık hizmetlerini bir hekim gibi gerçekleştirebileceğini, birçok alanda olumlu etkiler yapacağını ve uzmanlık eğitiminde sağlıkta yapay zeka dersleri olmasını istiyordu. Bu sebeple aile hekimliği asistanlarının yapay zeka alanında eğitim alarak bilgi düzeylerinin artırılması verilen sağlık hizmeti sunumuna katkı sunacaktır.

Anahtar Kelimeler: Yapay zeka, aile hekimliği, eğitim, teletıp, dijital sağlık

Introduction

Artificial intelligence (AI), which is used to describe a wide range of fields, refers to systems that exhibit intelligent behavior such as learning, visual perception, speech recognition, algorithm and statistical model development, categorization, prediction, decision-making, benchmarking, and creativity, by analyzing data to achieve a certain goal. AI reduces the differences between computer systems and humans' daily activities[1-4].

The foundations of AI can be traced to Alan Turing, the founder of modern computers. In 1950, Turing proposed the idea of using computers to simulate intelligent behavior and critical thinking and proposed the Turing test to evaluate this. John McCarthy planned a conference to develop his ideas in this field and called this field "Artificial Intelligence". In 1956, a conference on thinking machines that can imitate human intelligence and behavior was held at Dartmouth College, New Hampshire, USA, and this was considered the official beginning of research on AI. These studies have continued to accelerate in recent years[4].

AI applications are now integrated into daily life with many advantages and industry support. AI facilitates decision-making processes by analyzing large amounts of data at a speed and with a low error rate it provides in repetitive tasks, personalized recommendations it provides with the data it obtains, security it provides against cyberattacks and other fraud attempts, and mobility it provides to disabled individuals. These opportunities may also cause job anxiety in those who undertake these jobs. In the industry, AI is widely used for voice assistants, e-commerce applications, online TV platforms, cybersecurity, social networks, banking transactions, academic research, etc. In the field of health, applications developed with AI are used in processes such as keeping health records, radiological and pathological diagnosis processes, prognosis determination, treatment protocols, medical imaging, symptom tracking, personalized medicine, and drug and vaccine development, with increasing data density. AI applications are compared with doctors in many areas, such as pathological examinations of cancer and metastases, dermatological diagnosis processes, eye diseases, such as diabetic retinopathy, congenital cataracts, macular degeneration, polyps detected in colonoscopy, and echocardiography findings, especially radiological imaging. Computer applications developed with AI intelligence support the provision of personalized healthcare services to patients in primary care, which is the most common application area for these patients. Physicians can use AI to record patient history and physical examination findings. Thus, they save the time they can spare for their patients. It is obvious that AI will be used in medical applications in the future. For this reason, the opinions and knowledge levels of family medicine assistants who will work in primary care regarding AI are important[5-10].

The importance of the use of AI in primary healthcare is increasing daily. Long-term care and coordination services provided to certain populations enable the use of AI in this field. For this reason, primary care physicians must adapt to working with AI. The prejudiced approach of physicians toward the use of AI and their lack of sufficient knowledge are among the obstacles to working together. Providing physicians adequate training on AI and enabling them to practice can eliminate these obstacles. It is noteworthy that two-thirds of medical faculty students do not have knowledge about AI[11].

Medical education should include competencies in the use of modern technology and simulations, data collection, analysis skills, and utilization through AI applications. Physicians should therefore have sufficient knowledge of the diagnostic, therapeutic, and rehabilitation services offered to patients using AI and be able to resolve any concerns, confusion, or questions about the process. Physicians are also responsible for making AI a useful technology for patient care[12].

Health systems are currently faced with increasing chronic and multimorbidity, and the clinical and economic burden of this situation poses a major challenge for optimal healthcare delivery. Health systems must adapt to new challenges to meet growing healthcare needs. Innovations in digital health around the world have been taking place in primary care for some time, but the extent of its use still varies widely both within and between countries. Digital health in family medicine has great potential for chronic disease monitoring and patient management, disease prevention, and reduced healthcare costs. It is also very useful to use technology to provide individualized health care.

In this study, we aimed to determine the areas of AI use and evaluate the use of AI in the field of health and the knowledge and approaches of family medicine residents.

Materials and Methods

The study population consisted of 430 resident physicians who received specialty training in family medicine at university hospitals in İzmir. The sample size was calculated using Open Epi as at least 204 people with a 95% confidence interval of 5% margin of error when 50% was taken as the unknown frequency. Before starting the study, ethics committee approval was obtained from İzmir Katip Çelebi University Non-Interventional Clinical Research Ethics Committee (decision no: 0458, date: 26.10.2023). In our study, a data questionnaire prepared by the researchers by making use of the literature was used to collect data. The questionnaire was completed online via Google forms. In the first part of the questionnaire form, the participants' internet usage habits and their use of AI applications in daily life were questioned (7 questions), and in the second part, their opinions on the use of AI in the field of health were questioned (12 questions). The questionnaire was kept open for about 2 months until the quorum was reached.

Statistical Analysis

The data were analyzed using the SPSS 24.0 statistical package and evaluated using descriptive statistics. The conformity of variables to normal distribution was analyzed by visual (histogram) and analytical methods (Kolmogorov-Smirnov tests). Numerical data collected in the study were expressed as mean, median, standard deviation, or range of values; categorical data were expressed using descriptive methods, such as ratios and percentages[13-15].

Results

A total of 204 participants were included in our study, 108 (52.9%) of whom were female, 96 (47.1%) were male, and the mean age was 28.88 (min: 25, max: 45). The distribution was as follows: 33.8% from Dokuz Eylül University, 29.4% from İzmir Katip Çelebi University, 20.6% from Bozyaka Training and Research Hospital, and 16.2% from University of Health Sciences Turkey, İzmir Tepecik Education and Research Hospital. Moreover, 82.4% of the participants spent more than 3 hours a day on the internet. All participants had a mobile phone, while 82.4% had a laptop computer.

When the purposes of using the internet were evaluated, it was determined that the most common reasons for using the internet were social media (88.2%), education/research 72.1% and shopping 69.1% (Table 1).

When the knowledge of the participants in terms of examples of AI used in daily life was questioned, it was observed that they were most frequently informed about banking (83.8%), social networks (82.4%), online TV platforms (75%) and e-commerce applications (75%) (Graphic 1).

When asked to evaluate their level of knowledge about the use of AI in the field of health, 64.7% of the participants stated that they had basic knowledge. The percentage of those without knowledge in this field was 17.6% (Graphic 2).

| Table 1. Areas of use of the ınternet by the participants				
	Yes (percentage)	n	No (percentage)	n
Social media	88.2%	180	11.8%	24
Education	72.1%	147	27.9%	57
Shopping	69.1%	141	30.9%	63
Spending time	67.6%	138	32.4%	66
Communication	63.2%	129	36.8%	75
Entertainment/games	57.4%	117	42.6%	87

When the level of knowledge of the participants regarding AI topics used in the field of health was evaluated, medical imaging ranked first with 69.1%, followed by diagnostic processes with 57.4%, and treatment protocols with 50% (Graphic 3).
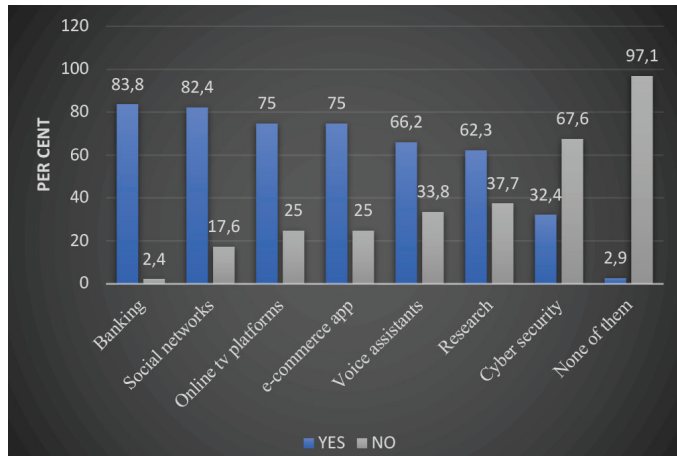
Graphic 1. Participants' knowledge on artificial intelligence areas used in daily life
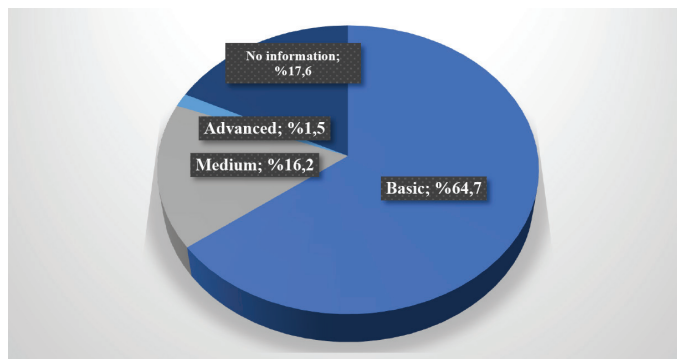
Graphic 2. Distribution of participants' level of knowledge on artificial intelligence
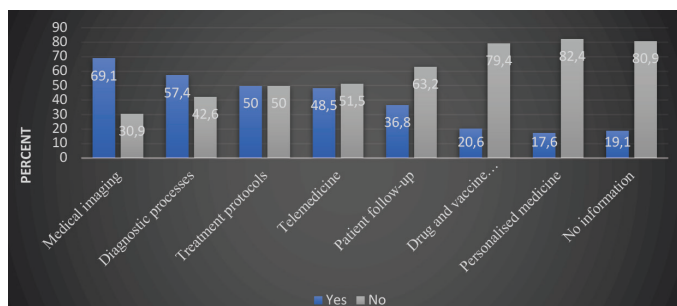
Graphic 3. Participants' level of knowledge on health and AI topics

AI: Artificial intelligence

Considering the increasing inclusion of AI in our lives; 82.4% of the participants expressed curiosity, 61.8% excitement, and 39.7% anxiety. When asked about the effect of AI on medical diagnosis and treatment processes, 57.4% of the participants stated that it had a positive effect, whereas 26.5% stated that they had no opinion on the effect. When asked about their opinions on which areas of medicine AI will be used in the coming years, 89.7% of the participants answered in internal medical sciences, 83.8% in basic medical sciences, and 63.2% in surgical medical sciences. Moreover, 83.8% of the participants had not attended any training, congress, conference, or symposium on AI to date, and 85.3% wanted to have AI in health courses in specialty education.

One of the questions asked the participants was to evaluate whether AI could perform some tasks similar to a physician. The highest response rate was obtained from medical records 98.5%. The lowest empathizing rate was 4.4% (Graphic 4).

When the effect of AI on examination processes was evaluated, it was thought that AI would contribute 97.1% to the time taken for diagnosis and 80.9% to the decrease in treatment costs (Graphic 5).

66.2% of the participants did not think that AI would take over their jobs in the future. In addition, 20.6% were undecided and 13.2% thought that AI could take over their jobs. In terms of determining whether AI was reliable, 60.3% of the participants were undecided, 35.3% found it reliable, and 4.4% did not find it reliable.

Discussion

In this study, we aimed to evaluate the knowledge and approaches of family medicine assistants regarding the use of AI in healthcare. AI technologies are now used in various fields, such as disease diagnosis, treatment planning,
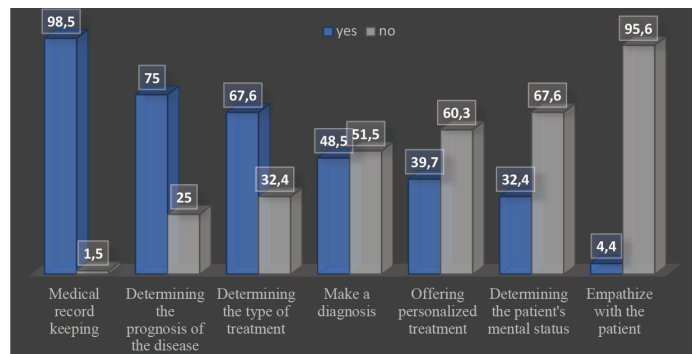
Graphic 4. Which tasks can artificial intelligence perform like a physician
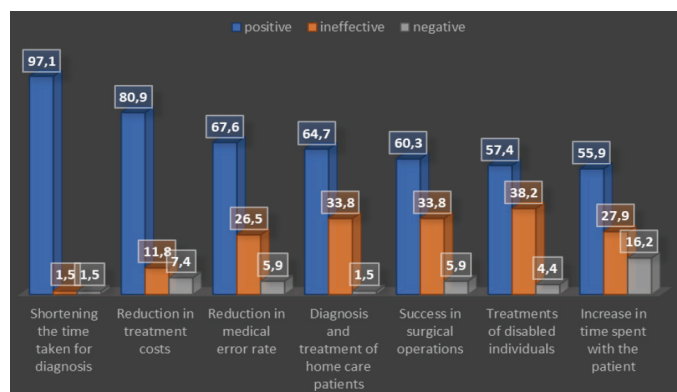
Graphic 5. Impact of artificial intelligence on examination processes

prognosis determination, and patient follow-up, in family medicine practice. The applications support physicians in areas like early diagnosis of chronic diseases, radiological image analysis, drug interactions, contraindications, rational drug use, reminders for missed vaccinations, risk score calculation, and monitoring of target values. Most family medicine assistants in our study were knowledgeable about AI applications in medical imaging, diagnostic processes, and treatment protocol determination. However, less than half were aware of AI applications in areas like telemedicine, patient follow-up, drug and vaccine development, and personalized medicine. This could be attributed to the fact that many family medicine assistants primarily focus on clinical practice, where telemedicine or drug development may not be frequently encountered, leading to less exposure to such AI applications. Approximately 20% of the participants were unaware of AI applications in healthcare, likely due to the lack of outpatient clinic experience among family medicine assistants. This suggests that exposure to real-world AI applications in clinical settings may significantly enhance patient awareness and understanding, highlighting the importance of hands-on experience in AI training programs.

When asked to evaluate their knowledge level regarding AI usage in healthcare, 64.7% of participants stated that they had basic knowledge, while 17.6% claimed to have no knowledge at all. This percentage is similar to the 78.4% reported in Waheed and Liu's[16] study on AI application in primary healthcare in Qatar. The similarities between the family medicine systems of Qatar and Turkey may explain this resemblance. Both countries' healthcare systems share common characteristics in their approach to family medicine, particularly in managing chronic diseases and providing continuous care. Therefore, it is likely that similar levels of

AI knowledge are rooted in these shared systemic structures. In a study by Antes et al.[17] in the U.S., younger individuals were found to be more open to AI usage, a trend reflected in our study, as participants were predominantly younger, internet-savvy individuals. other studies in Turkey have also emphasized the need for training to increase the knowledge and awareness of healthcare professionals regarding the effective use of AI systems[18-21]. The young demographic in our study could also explain the higher levels of optimism and willingness to engage with AI technology, as younger professionals tend to be more adaptable and tech-savvy. The awareness level could be further increased through symposiums, conferences, and conferences, as well as training in this field.

Among the physicians in our study cohort, 83.8% had not attended any training, congress, conference, or symposium on AI, and 85.3% expressed a desire for AI courses in their specialties. In Ganapathi's study exploring the experiences and views of doctors working with AI in English healthcare, participants similarly reported a need for education and mentorship in this area. Baser et al.[18] study in Turkey also showed that 95% of family physicians had not received any AI training[21]. These results highlight the significant gap in AI education. This gap could stem from the relatively recent integration of AI technologies into healthcare and the lack of updated curricula in medical schools, particularly in family medicine programs. Addressing this gap requires not only introducing AI topics but also offering practical workshops where physicians can interact with AI systems. The World Medical Association advocates for adjustments in medical training curricula to help physicians better understand AI. Numerous studies have also suggested that current medical education is insufficient in terms of AI knowledge and call for reform. Incorporating AI-related knowledge and skill-building activities during residency can facilitate physicians' adaptation to future AI applications[11,22-26].

When asked about the impact of AI on medical diagnosis and treatment, more than half of the respondents were optimistic. Almost all participants believed that AI would shorten diagnosis times. Furthermore, the participants expressed positive views regarding various parameters, including reducing treatment costs, decreasing medical error rates, contributing to home care diagnosis and treatment, improving surgical outcomes, and increasing the time allocated to patients. These findings mirror global trends in healthcare, where AI is increasingly recognized for

its ability to optimize time management, cost efficiency, and accuracy in medical procedures. In Turkey, where healthcare resources are limited, AI could play a crucial role by enhancing workflow and reducing the burden on physicians. These findings suggest that family medicine assistants have a positive outlook on AI use. Similar studies have reported favorable attitudes toward the use of AI in clinical settings[27-30]. Consistent results across different physician groups indicate that physicians are generally willing to incorporate AI-supported applications into their decision-making processes for diagnosis and treatment.

The majority of participants believed that AI could maintain medical records, determine disease prognosis, and select treatment types that are similar to those of a physician. However, nearly all of the participants believed that AI lacked the empathy skills of a physician, and two-thirds believed that AI could not replace physicians. This observation is important because it reinforces the notion that AI, while powerful, lacks the human touch required in patient care. Physicians' ability to communicate, show compassion, and understand patients' emotional and cultural contexts is something AI currently cannot replicate. These findings align with those of other studies in the literature[16-18,21,22,27,30-34]. The increasing use of computer systems for medical record, diagnosis, and prognosis determination may have contributed to the belief that AI can perform certain tasks like a physician. However, participants likely recognized that empathy involves more than basic skills because it requires understanding the cultural background and patient knowledge levels. Family physicians often build long-term relationships with patients, making them more likely to value the personal aspects of care, which AI has yet to achieve. Given that empathy is a fundamental component of patient-physician communication, participants may have concluded that AI cannot fully replace human doctors.

Study Limitations

Our study was applied to family medicine residents who were receiving specialty training in İzmir province using the online survey method. The limitations of our study are that the questionnaire may have been completed only by residents who are interested in the subject because it was administered by an online survey method and that it may not be sufficient to reflect the country in general because it was conducted in a single province.

Conclusion

Our study on AI knowledge levels of family medicine residents emphasizes the importance of education and awareness in this field. Our research results revealed that most participants had a basic knowledge of AI, but a deeper understanding and training of the medical applications of this technology are required. In particular, family medicine residents require more comprehensive training programs to fully understand the potential of AI in areas such as diagnosis, treatment planning, and patient management, and to use this technology effectively.

These findings demonstrate the importance of integrating AI into medical education. We suggest that educational institutions should offer specialized courses and workshops on topics such as AI applications, ethical considerations, and patient data protection for family medicine residents. In addition, innovation and developments in this field should be encouraged through continuing professional development programs.

In conclusion, increasing the level of AI knowledge among family medicine residents is critical for both increasing the quality of patient care and improving the efficiency of healthcare services. In this regard, updating training programs and supporting continuous professional development will facilitate the integration of progress in this field into health services and ensure effective use of AI in family medicine practice.

Ethics

Ethics Committee Approval: The study was approved by İzmir Katip Çelebi University Non-Interventional Clinical Research Ethics Committee (decision no: 0458, date: 26.10.2023).

Informed Consent: Our study was conducted using a survey method with physicians, and information was provided before the survey and their approval was obtained. Physicians who agreed to participate completed the survey.

Footnotes

Authorship Contributions

Surgical and Medical Practices: İ.Ç., E.M.K., Concept: İ.Ç., E.M.K., Design: İ.Ç., E.M.K., Data Collection or Processing: İ.Ç., Analysis or Interpretation: İ.Ç., E.M.K., Literature Search: İ.Ç., E.M.K., Writing: İ.Ç.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

References

1. Kaplan A, Haenlein M. Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence. Business Horizons. 2019;62:15-25.

2. Choi RY, Coyner AS, Kalpathy-Cramer J, Chiang MF, Campbell JP. Introduction to machine learning, neural networks, and deep learning. Transl Vis Sci Technol. 2020;9:14.

3. Cupples A. Artificial intelligence in medicine. Ulster Med J. 2024;92:167-9.

4. Vodanović M, Subašić M, Milošević D, Savić Pavičin I. Artificial intelligence in medicine and dentistry. Acta Stomatol Croat. 2023;57:70-84.

5. Nash FA. Differential diagnosis, an apparatus to assist the logical faculties. Lancet. 1954;266:874-5.

6. Akinrinmade AO, Adebile TM, Ezuma-Ebong C, et al. Artificial intelligence in healthcare: Perception and reality. Cureus. 2023;15:e45594.

7. Iqbal JD, Vinay R. Are we ready for artificial intelligence in medicine? Swiss Med Wkly. 2022;152:w30179.

8. Teng X. Discussion about artificial intelligence's advantages and disadvantages compete with natural intelligence. ISPECE. 2019;1187:032083.

9. Amisha, Malik P, Pathania M, Rathaur VK. Overview of artificial intelligence in medicine. J Family Med Prim Care. 2019;8:2328-31.

10. Topol EJ. High-performance medicine: the convergence of human and artificial intelligence. Nat Med. 2019;25:44-56.

11. Liaw W, Kueper JK, Lin S, Bazemore A, Kakadiaris I. Competencies for the use of artificial intelligence in primary care. Ann Fam Med. 2022;20:559-63.

12. Öcal EE, Atay E, Önsüz MF, et al. The attitude of medical school students about artificial intelligence applications in medicine. TÖAD. 2020;2:9-16.

13. Cochran WG. Sampling techniques. 3rd ed. John Wiley & Sons. 1977.

14. Dillman DA, Smyth JD, Christian, LM. Internet, phone, mail, and mixed mode surveys: The tailored design method (4th ed.). John Wiley & Sons Inc. 2014.

15. Pallant J. SPSS survival manual: A step by step guide to data analysis using IBM SPSS. 7th ed. Routledge. 2020. p.378.

16. Waheed MA, Liu L. Perceptions of family physicians about applying AI in primary health care: Case study from a premier health care organization. JMIR AI. 2024;3:e40781.

17. Antes AL, Burrous S, Sisk BA, Schuelke MJ, Keune JD, DuBois JM. Exploring perceptions of healthcare technologies enabled by artificial intelligence: an online, scenario-based survey. BMC Med Inform Decis Mak. 2021;21:221.

18. Baser A, Baktır Altuntaş S, Kolcu G, Özceylan G. Artificial intelligence anxiety of family physicians in Turkey. Progr Nutr [Internet]. 2021;23:e2021275.

19. Bozyel S, Şimşek E, Koçyiğit Burunkaya D, et al. Artificial intelligence-based clinical decision support systems in cardiovascular diseases. Anatol J Cardiol. 2024;28:74-86.

20. Başar EE, Erkul AK. Factors affecting the attitude of medical doctors in türkiye towards using artificial intelligence applications in healthcare services. Bezmialem Science. 2024;12:297-308.

21. Ganapathi S, Duggal S. Exploring the experiences and views of doctors working with Artificial intelligence in English healthcare; a qualitative study. PLoS One. 2023;18:e0282415.

22. Civaner MM, Uncu Y, Bulut F, Chalil EG, Tatli A. Artificial intelligence in medical education: a cross-sectional needs assessment. BMC Med Educ. 2022;22:772.

23. Liaw W, Kakadiaris IA. Artificial intelligence and family medicine: Better together. Fam Med. 2020;52:8-10.

24. Masters K. Artificial intelligence in medical education. Med Teach. 2019;41:976-80.

25. Wartman SA, Combs CD. Medical education must move from the information age to the age of artificial intelligence. Acad Med. 2018;93:1107-9.

26. AlZaabi A, AlMaskari S, AalAbdulsalam A. Are physicians and medical students ready for artificial intelligence applications in healthcare? Digit Health. 2023;9:20552076231152167.

27. Oh S, Kim JH, Choi SW, Lee HJ, Hong J, Kwon SH. Physician confidence in artificial intelligence: An online mobile survey. J Med Internet Res. 2019;21:e12422.

28. Blease C, Worthen A, Torous J. Psychiatrists' experiences and opinions of generative artificial intelligence in mental healthcare: An online mixed methods survey. Psychiatry Res. 2024;333:115724.

29. Al-Medfa MK, Al-Ansari AMS, Darwish AH, Qreeballa TA, Jahrami H. Physicians' attitudes and knowledge toward artificial intelligence in medicine: Benefits and drawbacks. Heliyon. 2023;9:e14744.

30. Kaymakçı V, Kasap İ, Sevindi M, Mevsim V. The role and future of artificial intelligence in primary care. Jour Turk Fam Phy. 2024;15:26-37.

31. Krittanawong C. The rise of artificial intelligence and the uncertain future for physicians. Eur J Intern Med. 2018;48:e13-4.

32. Inkster B, Sarda S, Subramanian V. An empathy-driven, conversational artificial intelligence agent (Wysa) for digital mental well-being: Real-world data evaluation mixed-methods study. JMIR Mhealth Uhealth. 2018;6:e12106.

33. Doraiswamy PM, Blease C, Bodner K. Artificial intelligence and the future of psychiatry: Insights from a global physician survey. Artif Intell Med. 2020;102:101753.

34. Blease C, Kaptchuk TJ, Bernstein MH, Mandl KD, Halamka JD, DesRoches CM. Artificial intelligence and the future of primary care: Exploratory qualitative study of UK general practitioners' views. J Med Internet Res. 2019;21:e12802.