ISSN (P) : 2589-9120 / (O) : 2589-9139
PubMed-National Library of Medicine - ID: 101773527

International Journal of Medical Science and Applied Research (IJMSAR)

Available Online at: https://www.ijmsar.com

Volume – 7, Issue – 6, December – 2024, Page No. : 23– 31

Healthcare and Medical Education in Digital Era: Role of Chat GPT versus Google Chrome

[1]Pujari Sree Ramya, [2]Thulasi Gokul, [3]Jhansi Vani Choppara, [4]Chandrakala Kambar

[1]Postgraduate, Department of Pharmacology, Government Medical College, Ongole, India

[2]Assistant Professor, Department of Pharmacology, Government Medical College, Ongole, India

[3]Associate Professor, Department of Pharmacology, Government Medical College, Ongole, India

[4]Professor and HOD, Department of Pharmacology, Government Medical College, Ongole, India

Citation of this Article: Pujari Sree Ramya, Thulasi Gokul, Jhansi Vani Choppara, Chandrakala Kambar, "Healthcare and Medical Education in Digital Era: Role of Chat GPT versus Google Chrome" IJMSAR – December –2024, Vol. – 7, Issue - 6, Page No. 23-31.

Corresponding Author: Pujari Sree Ramya, Postgraduate, Department of Pharmacology, Government Medical College, Ongole, India

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Artificial Intelligence tools like Chat generative pre-trained Transformer (ChatGPT) can generate text-based content and probably has the potential to become a major source of information for medicine and beyond. Therefore, this study was done to evaluate the performance of the ChatGPT against web browser Google Chrome in terms of accuracy and reliability by using a validated questionnaire. The participants were randomly divided into two groups—Group A used ChatGPT and Group B used Google Chrome. They were subjected to the validated questionnaire comprising of adverse drug reaction (ADR) report, and case scenarios and drug sections, following which a feedback questionnaire was provided to the participants evaluating accuracy, reliability and scope of artificial intelligence in healthcare and medical education. In terms of speed and simplicity of use, ChatGPT far exceeded Google Chrome. Expert evaluations verified that both tools delivered factually accurate outputs. ChatGPT's model (R^2 = 66.6% and p = 0.006) exhibits a great predictive ability, hence improving diagnosis accuracy. By contrast, Chrome's model shows less predictive ability, (R^2 = 49.5% p = 0.142). Although both technologies have value, this study shows that for personalized learning and precise information retrieval in medical education, ChatGPT's additional features and better predictive performance makes it a more efficient.

Keywords: ChatGPT, Artificial Intelligence, Google Chrome, Personalized Learning, Adverse Drug Reactions (ADRs), Medical Education.

Introduction

Artificial Intelligence (AI), especially large language models like ChatGPT [(1)] is increasingly redefining medical education and patient management by complementing traditional browser-based learning and decision-making tools. ChatGPT offers interactive, personalized, and context-aware educational experiences, allowing medical professionals and students to engage in real-time question-and-answer sessions, simulate clinical decision-making, and explore complex medical topics in a more conversational manner. [(2)] This immediate access to information, integrated with AI's ability to contextualize and explain concepts based on specific queries, provides an innovative learning platform. [(3)] In medical education, AI can enhance understanding by breaking down intricate medical concepts, [(4)] offering tailored explanations, and generating interactive case scenarios, enabling a more hands-on learning approach. [(5)] In patient management, the role of AI—specifically conversational agents like ChatGPT—extends to assisting with diagnostic suggestions, treatment planning, and patient education. [(6)] AI can analyze a patient's symptoms in real time, cross-reference medical databases, and provide potential differential diagnoses, which can assist healthcare providers in their decision-making processes. AI can also help in explaining medical conditions or treatment plans to patients in a simplified manner, ensuring better comprehension and engagement.

Traditional browsers provide a gateway to a wealth of medical information in the form of peer-reviewed articles, guidelines, and authoritative sources, which ensures that the information is validated albeit at the cost of greater time and effort. Traditional browsers in patient management are typically used for referencing static medical guidelines or research papers, [(7)] which require manual searching, reading, and interpretation by healthcare providers. While effective, this process lacks the interactivity and efficiency especially in urgent or complex clinical situation. In medical education, they are valuable in e – learning which includes video lectures, interactive modules. However, they often rely on the user's ability to sift through articles, research papers, and clinical guidelines, [(8)] which can be time-consuming. In contrast to AI, traditional browsers such as chrome lacks the ability to tailor content in terms of directly responding to the user queries based on user input.[(8)] With an increasing trend of using AI tools for medical education and healthcare, this study was undertaken in order to evaluate the performance of the ChatGPT against the benchmark web browser Google Chrome in terms of accuracy and reliability in responding to questions concerning adverse drug reactions (ADRs), case scenarios, and drug assessments.

Materials & Method

A. **Study Design:** It was a validated questionnaire-based cross-sectional study conducted at Government Medical College, Ongole among the first-year postgraduate students. It was a self – administered questionnaire and for any queries, the participants could reach out through telephone or e-mail provided in the questionnaire.

B. Participant Recruitment and Consent: Eligibility criteria was all first-year postgraduate students willing to participate were taken up for the study after obtaining informed consent from them. Only first year students were taken up for this study as the foundation knowledge remains almost consistent in all of them. The participants were briefed about the nature and purpose of the study before subjecting them to the questionnaire. The study was conducted after receiving approval from Institutional Ethics Committee with certificate number:

C. Group Division and Tool Assignment: The participants were randomly divided into two groups—Group A and Group B by means of simple randomisation. Group A used Chat GPT while Group B used Google Chrome browser. The study intended to directly assess how postgraduate students engaged with Chat GPT or Google Chrome mediums in terms of answering to the different sections in the questionnaire.

D. Task Assignment and Questionnaire Distribution: Each group received same validated questionnaire split into three sections: adverse drug reaction (ADR) reporting, case scenario and drug assessment. Every portion had a set of questions to assess their designated tool—ChatGPT or Google Chrome—to assess accuracy, reliability. Only Chat GPT and Google Chrome was utilized for the questionnaire and no other browsers were used.

E. Usage of ChatGPT and Google Chrome: Using either ChatGPT or the Google Chrome browser, the participants in both groups evaluated the given case scenarios and drug assessments, ADR reports. Using these tools, they retrieved data, examined facts, and answered to the case-based questions. Emphasising accuracy, reliability in answering the questions, the use of these platforms was watched to see how each group interacted with their designated tool.

F. Feedback Collection: Each participant received a feedback form which addressed elements such as its role in medical education, if useful in diagnosis, reliability and what could be the scope of AI in future.

G. Expert Opinion and Evaluation: Apart from participant comments, expert opinions were acquired for the same validated questionnaire to assess the correctness and dependability of the acquired data by both tools.

H. Statistical Analysis: The collected data was subjected to statistical analysis using SPSS software.

Results & Discussion

This study is the first of its kind to evaluate the performance of ChatGPT with Google Chrome browser in terms of accuracy and reliability by using validated questions concerning adverse drug reactions (ADRs), case scenarios, and drug assessments.

ADR Scenario:

Chrome:

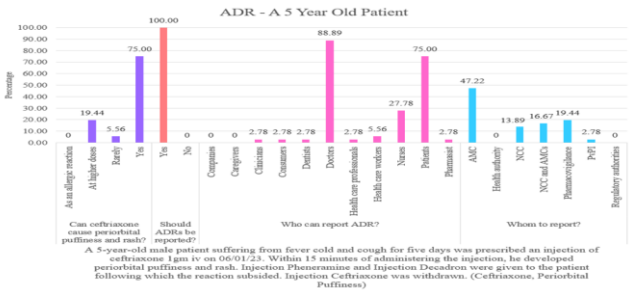

Figure 1: ADR Scenario: (Ceftriaxone, periorbital puffiness) in Chrome

The figure 1 shows a five-year-old child who got periorbital puffiness and dermatitis following administration of ceftriaxone. The participant responses comprised of doctors (88.89%), patients (75%), nurses (27.78%), health care workers (5.56%), clinicians, consumers, dentists and pharmacists (2.78%). ADRs can be reported to the adverse drug monitoring centre (AMC), pharmacovigilance (19.44%) Apart from their responses, few additional responses in google chrome were also mentioned in the figure 1 which were not included in the participant responses.

Chat GPT:

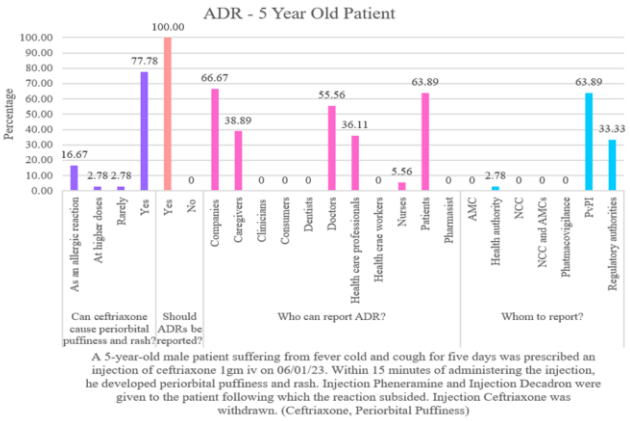

Figure 2: ADR Scenario: (Ceftriaxone, periorbital puffiness) in Chat GPT

The figure 2 shows a five-year-old child who got periorbital puffiness and dermatitis following administration of ceftriaxone. The participant responses comprised of companies (66.67%), patients (63.89%) doctors (55.56%) caregivers (38.89%) and other healthcare professionals (36.11%) can report ADRs and whether ceftriaxone can induce such a reaction. ADRs can be reported to the PvPI (63.89%) and to regulatory authorities (33.33%). Additional responses in ChatGPT were also mentioned in the figure 2 which were not included in the participant responses.

Case Scenario:

Chrome:

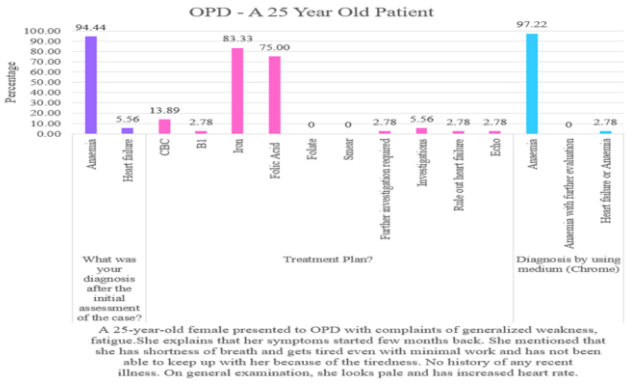

Figure 3: Case of a 25-year-old female with complaint of generalised weakness in Chrome

Figure 3 describes a case of 25-year-old female presented with complaints of generalized weakness, fatigue and shortness of breath. 94.44% diagnosed it as anaemia with a treatment plan of Iron supplementation (83.33%), Folic Acid (75%). Diagnosis using chrome was anaemia.

Chat GPT:

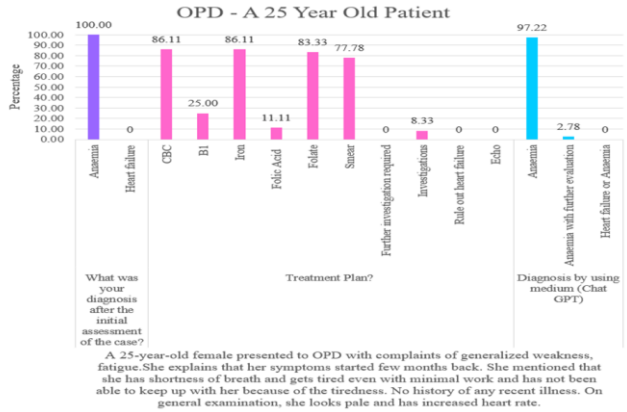

Figure 4: Case of a 25-year-old female with complaint of generalised weakness in Chat GPT

Figure 4 describes a case of 25-year-old female presented with complaints of generalized weakness, fatigue and shortness of breath. All the participants diagnosed it as anaemia. Management included investigations such as complete blood picture (86.11%), smear (77.8%) with treatment of Iron

(86.11%) and folate (83.33%). The diagnosis made by Chat GPT was also anaemia.

Drug Assessments:

Chrome:

Drug A:

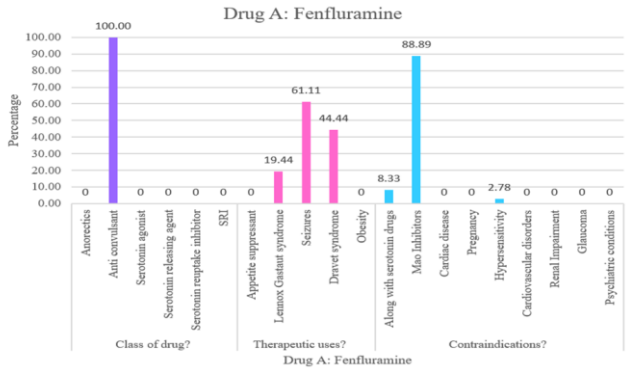

Figure 5: Shows Fenfluramine class, uses and contraindications in Chrome

Figure number 5 depicts the drug fenfluramine class, therapeutic uses and contraindications using chrome as the medium. On using chrome, it was observed that the drug belonged to anticonvulsant class with therapeutic uses seizures (61.11%), Lennox Gastaut Syndrome (19.44%), Dravet syndrome (44.44%). Using Mao inhibitors (88.89%), serotonin drugs (8.3%) and hypersensitivity were contraindications (2.78%).

Drug B:

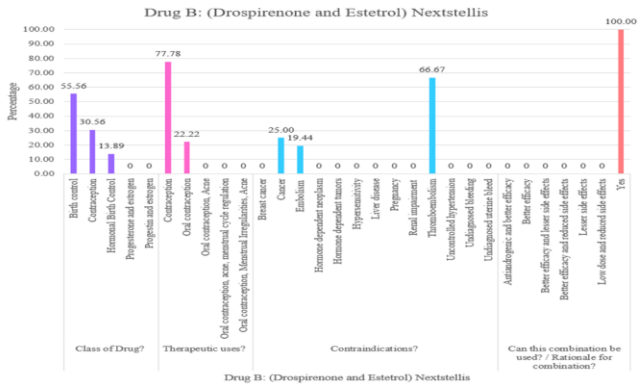

Figure 6: shows Nexstellis class, uses, contraindications and rationale for combination in Chrome.

Figure number 6 describes the Nextstellis (Drospirenone and Estetrol) class of drug, therapeutic uses, contraindications and rationale of this combination. On using Chat GPT it was found that Nextstellis was classified under birth control (55.56%), contraception (30.56%) and as hormonal birth control (13.89%). Therapeutic uses included contraception (77.78%), oral contraceptive (22.22%). Contraindications were thromboembolism (66.67%), cancer (25%) and embolism (19.44%).

Chat GPT:

Drug A:

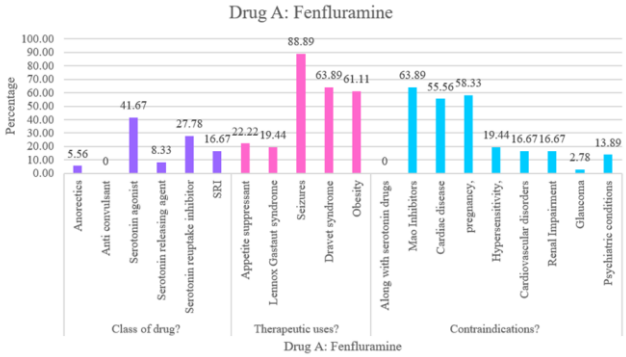

Figure 7: shows Fenfluramine class, uses and contraindications in Chat GPT

Figure 7 includes depicts the drug fenfluramine class, therapeutic uses and contraindications using Chat GPT as the medium. Fenfluramine was classified under serotonin agonist (41.67%), serotonin reuptake inhibitor (27.78%), SRI (16.67%), serotonin releasing agent (8.33%), anorectics (5.56%). Seizures (88.89%), Dravet syndrome (63.88%), Obesity (61.11%), appetite suppressant (22.22%) and Lennox Gastaut syndrome (19.44%) were therapeutic uses. Contraindications includes using Mao Inhibitors (63.89%), pregnancy (58.83%), hypersensitivity (19.44%) cardiac disease (55.56%), cardiac disorders (16.67%) and renal impairment (16.67%), psychiatric conditions (13.89%).

Drug B:

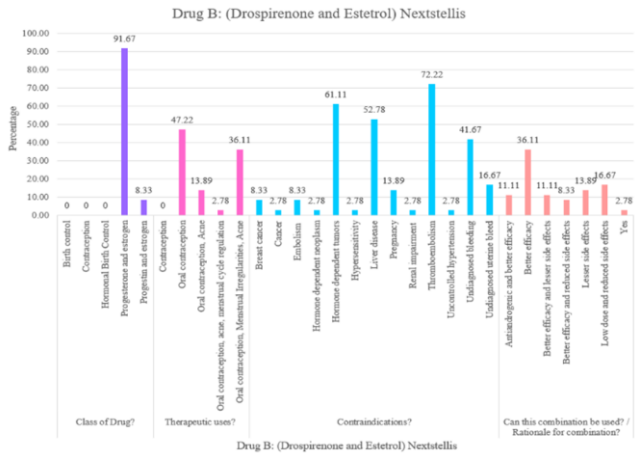

Figure 8: shows Nexstellis class, uses, contraindications and rationale for combination in Chat GPT

Figure number 8 shows the Nextstellis (Drosperinone and Estetrol) class of drug, therapeutic uses, contraindications, and rationale of this combination of using Chat GPT as the medium. The drug was classified under progesterone and estrogen combination (91.67%), and progesterone and estrogen (8.33%). The therapeutic uses included oral contraception (47.22%), menstrual irregularities, and acne (36.11%). Contraindications included thromboembolism (72.2%), hormone-dependent tumors (61.1%), liver diseases (52.78%), undiagnosed bleeding (41.67%), undiagnosed uterine bleeding (16.67%), pregnancy (13.89%). The rationale of the combination was better efficacy (36.11%), low dose, and reduced side effects (16.67%).

For all three sections of adverse drug reaction, case scenario, and drug assessments, ChatGPT has provided more additional responses compared to Google Chrome.

Regression results of Chrome:

Table 1: ANOVA results: Impact of variables on diagnosis accuracy using Chrome

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	P
1	Regression	0.482	13	0.037	1.661	0.142[b]
	Residual	0.491	22	0.022		
	Total	0.972	35			
a. Dependent Variable: Diagnosis by using Chrome						
b. Predictors: (Constant), What do you think will be the scope of AI in the future? Who can report ADR, are they useful for helping to reach a diagnosis and treatment, whom to report, how reliable do you think they are, Contraindications, Class of the drug, can this combination be used? The rationale for a combination? Can ceftriaxone cause periorbital puffiness and rash, can it be used as an educational tool, how accurate do you think these are, Therapeutic uses_, Gender						

The ANOVA test evaluates the significance of multiple predictors for diagnosing using Chrome. The regression model is not statistically significant (p = 0.142), indicating that the predictors do not collectively explain a substantial portion of the variance in diagnosis accuracy.

Model Summary:

With 49.5% of the variation, the model summary for diagnostic accuracy using Chrome revealed a modestly positive correlation (R = 0.704) between the independent and dependent variables. With an estimated standard error of 0.149, the fit seems to be

excellent. The F-value of 1.656 and p-value of 0.142, however, show that the model is not statistically significant—that is, the predictors taken as a whole do not greatly affect the diagnosis outcome.

Regression results of Chat GPT:

Table 2: ANOVA results: Impact of variables on diagnosis accuracy using Chat GPT

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.648	13	.050	3.381	.006[b]
	Residual	.324	22	.015		
	Total	.972	35			
a. Dependent Variable: Diagnosis by using ChatGPT						
b. Predictors: (Constant), What do you think will be the scope of AI in the future in medical and healthcare? How accurate do you think these are? Class of Drug, Can it be used as an educational tool, Who can report ADR, Are they useful for helping to reach a diagnosis and treatment, Class of drug , Can ceftriaxone cause periorbital puffiness and rash, Therapeutic uses , Gender, How reliable do you think they are, Can this combination be used Rationale for combination, Whom to report						

The importance of variables for ChatGPT diagnosis is evaluated using the ANOVA test and the model is statistically significant (p=0.006).

Model Summary:

A significant regression model with an F-statistic of 3.381 (p = 0.006) revealed in the model summary for diagnostic accuracy using ChatGPT. This suggests that the predictors together account for a sizable amount of the variance in diagnosis accuracy. This demonstrates ChatGPT's usefulness in diagnostic applications by indicating that the variables—drug class, side effects, and therapeutic uses, for example—have a significant influence on the precision of diagnoses made using it.

Comparison of Chrome vs Chat GPT results:

Table 3: Comparison of diagnostic accuracy of Chrome vs ChatGPT

Metric	**Chrome**	**ChatGPT**	**Comments**
R (Correlation Coefficient)	0.704	0.816	ChatGPT has a stronger correlation with the dependent variable (Diagnosis).
R^2 (Variance Explained)	49.5%	66.6%	ChatGPT explains more variance, indicating a better fit.
Adjusted R^2	19.7%	46.9%	ChatGPT remains superior even after adjusting for predictors.
F-Statistic	1.661 (p = 0.142)	3.381 (p = 0.006)	ChatGPT's model is statistically significant, Chrome's is not.
Standard Error	0.149	0.121	ChatGPT has a lower standard error, indicating more precise predictions.

ChatGPT's diagnostic accuracy exceeds Chrome's. R^2 of 66.6% for ChatGPT against 49.5% for Chrome shows greater model fit. ChatGPT's predictions are more exact and statistically significant with a reduced standard error and greater F-statistic ($p = 0.006$).

In educational settings, both ChatGPT and Google Chrome offer valuable resources for retrieving medical information. ChatGPT excels in speed and user experience, making it ideal for quick consultations and straightforward queries. On the other hand, Google Chrome remains superior for in-depth research requiring exploration of multiple data sources. Both tools have potential to be integrated into personalized learning environments, with ChatGPT favored for its AI-driven efficiency and simplicity, while chrome is preferred for comprehensive data retrieval.

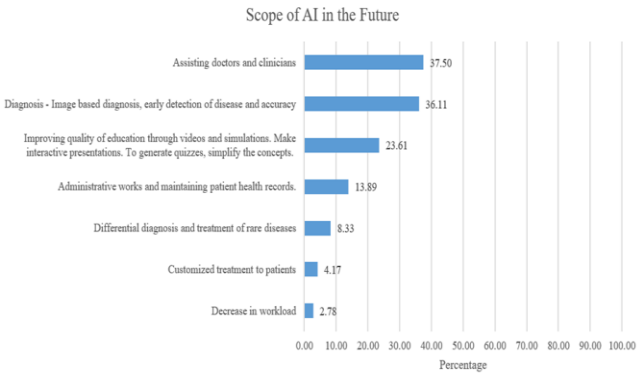

Figure 9: depicts the answers for the scope of AI in the future

The above figure gives an understanding of scope of the artificial intelligence in the future with regard to medical education and therapeutics. "Assisting doctors and clinicians" and "Diagnosis" were the top two answers where artificial intelligence would be helpful. Other areas noted were improved administration works, differential diagnosis, personalized treatment, and decreasing the workload of health care providers.

Limitations of the study:

Questions on participant's AI knowledge were not included in the study.

Probability of bias based on using different keywords for questions and their experience with AI tools.

Future studies may include undergraduate students in study as they are future working professionals and would be more impacted by artificial intelligence technologies.

Would be more impacted by artificial intelligence technologies.

Conclusion

AI offers an interactive, personalized learning experience, allowing medical professionals and students to engage in real-time question-and-answer sessions, simulate clinical decision-making, and explore complex medical topics in a more conversational manner. Though helpful for research and comments, Google Chrome did not match the prediction accuracy of AI-driven systems like ChatGPT. Even though AI tools such as Chat GPT have better processing and prediction accuracy, challenges with AI include data privacy, ethical concerns, diagnosing complex health conditions and the necessity of constant upgrades needs attention. Maximizing the advantages of artificial intelligence in healthcare and education depends on further responsible development of AI and transparent guidelines. AI technologies will progressively affect the direction of professional growth and education as they advance, therefore producing a more efficient, flexible, and informed society.

Acknowledgements

I express my sincere gratitude to my guide, Dr. Ch. Jhansi Vani (Associate Professor), Dr. K.

Chandrakala, (Professor & HoD) and Dr. Thulasi Gokul (Assistant Professor) for their valuable advice and inputs.

References

1. Niu B, Mvondo GFN. I Am ChatGPT, the ultimate AI Chatbot! Investigating the determinants of users' loyalty and ethical usage concerns of ChatGPT. J Retail Consum Serv. 2024;76:103562. https://doi.org/ 10.1016/ j. jretconser.2023.103562.
2. Tang M, Mishuris RG, Payvandi L, Stern AD. Differences in Care Team Response to Patient Portal Messages by Patient Race and Ethnicity. JAMA Netw Open. 2024;7(3):E242618. doi: 10.1001/jamanetworkopen.2024.2618.
3. Masters K, Correia R, Nemethy K, Benjamin J, Carver T, MacNeill H. Online learning in health professions education. Part 2: Tools and practical application: AMEE Guide No. 163. Med Teach. 2024;46(1):18-33. doi: 10.1080/ 0142159X. 2023.2259069.
4. Li Z, et al. Large language models and medical education: a paradigm shift in educator roles. Smart Learn Environ. 2024;11(1). doi: 10.1186/s40561-024-00313-w.
5. Sun X, et al. Trusting the Search: Unraveling Human Trust in Health Information from Google and ChatGPT. 2024:1-24. Available from: http://arxiv.org/abs/2403.09987.
6. Marquis YA, Oladoyinbo TO, Olabanji SO, Olaniyi OO, Ajayi SA. Proliferation of AI Tools: A Multifaceted Evaluation of User Perceptions and Emerging Trend. Asian J Adv Res Rep. 2024;18(1):30-35. doi: 10.9734/ajarr/ 2024/ v18i1596.
7. Papastratis I, Konstantinidis D, Daras P, Dimitropoulos K. AI nutrition recommendation using a deep generative model and ChatGPT. Sci Rep. 2024;14(1):1-18. doi: 10.1038/s41598-024-65438-x.
8. Pitchika V, Büttner M, Schwendicke F. Artificial intelligence and personalized diagnostics in periodontology: A narrative review. Periodontol 2000. 2024;220-231. doi: 10.1111/prd.12586.