World Journal of Biology Pharmacy and Health Sciences
eISSN: 2582-5542
Cross Ref DOI: 10.30574/wjbphs
Journal homepage: https://wjbphs.com/

(RESEARCH ARTICLE)

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AI and ChatGPT Use in Pharmacy: Knowledge and practices among students and professionals

GAYATHRI SHARMILI RS *, JANANI M, KARKUZHALI S, MOUNIKA MP, YAMUNA DEVI S, ARUNKUMAR M, ANGEL CHERIAN, NITHYA K, MOHAMMED AZARUDEEN J, ABINESH R, SYED AMAAN SA, THANISH KUMAR T and MOHAMMED HABEEB S

Department of pharmacy, shri Indra Ganesan Institute of Medical Science, Manikandam, Tiruchirappalli, Tamil Nadu, India.

World Journal of Biology Pharmacy and Health Sciences, 2025, 21(03), 047-053

Publication history: Received on 01 January 2025; revised on 15 February 2025; accepted on 18 February 2025

Article DOI: https://doi.org/10.30574/wjbphs.2025.21.3.0190

Abstract

The purpose of this study is to find out how much pharmacist know and have used ChatGPT in their practice. this cross-sectional study was carried out between November and December 2024 to assess the potential and problem that pharmacist observed while integrating chatbots powered by AI(ChatGPT) in pharmacy practice. The correlation among perceived advantages and worries changed into evaluated the use of spearman's rho correlation because of the data's non-everyday distribution. A convenient sampling technique was used to choose the participant and the study questionnaire was distributed utilizing an online platform (WhatsApp and Email). The potential advantages of ChatGPT in the pharmacy practice where widely acknowledge by the participant. the majority of participant (13.4%) concurred that educational material about drug interaction and pharmacy products provided using ChatGPT, with 82.3% of responders believe that ChatGPT is a machine learning algorithm.in contrast to those who were either unsure or had not heard of ChatGPT (23.4%), individuals who had heard of it were more likely to have strong concerns (68.5%) (p=0.002). finally, the result shows a significant association between the use and perception of the AI tool($p<0.001$). Although ChatGPT has shown promise in health and pharmaceutical practice, its application should be rigorously regulated by evidence-based law. According to the study's findings, pharmacists support the use of ChatGPT in pharmacy practice but have concerns about it use due to ethical reasons, legal problems, privacy concerns worries about the accuracy of the data generated data learning, and bias risk.

Keywords: Artificial intelligent; Pharmacy practice; ChatGPT; Machine learning; Pharmacy students & professionals

1. Introduction

Artificial intelligence (AI) is a broad field of computer science concerned with building smart machines capable of performing tasks that typically require human intelligence [1]. These duties encompass the ability for learning, adaption, rationalization, comprehension, fathoming summary concepts, and responsiveness to elaborate human traits, together with attention, emotion, creativity, etc. [2]. The Dartmouth Summer Research Project on AI, which started withinside the center of the 20th century, is in which the records of AI as a systematic discipline can be explored [3]. Following this, machine learning (ML) algorithms had been created, allowing the advent of predictions or selections primarily based totally at the styles visible in widespread facts sets [4]. Genetic algorithms have been in the end evolved the use of evolutionary ideas to become aware of the first-class answers to complex problems, neural networks, and different current methodologies [5].

Chatbots, powered with the aid of using AI, have come to be more and more famous in current years as a device to enhance affected person care and remedy management. One of the maximum promising chatbot fashions is ChatGPT, a

* Corresponding author: GAYATHRI SHARMILI RS

conversational agent constructed the usage of the GPT (Generative Pre-educated Transformer) language model [6]. ChatGPT is designed to help sufferers in answering health-associated questions and presenting customized advice. However, the fulfilment of this era relies upon at the know-how and enjoy of the pharmacists who use it [7, 8]. ChatGPT has attracted various reactions from the educational and clinical communities, reflecting the lengthy debate approximately the benefits and drawbacks of current AI technologies [9,10,11]. On one hand, ChatGPT, in conjunction with different Large Language Models (LLMs), may be beneficial for conversational and writing jobs, assisting to enhance the effectiveness and correctness of the desired output [12]. On the opposite hand, questions had been raised approximately capacity bias primarily based totally at the information units utilized in ChatGPT training, which can also additionally restriction its skills and result in factual Inaccuracies however alarmingly look like academically reasonable (a phenomenon referred to as hallucination) [12]. In addition, safety problems and the capacity for breaches with the dissemination of deceptive information via LLMs must be considered [12]. This studies ambitions to analyze pharmacists' cutting-edge information and revel in concerning the usage of ChatGPT of their practice. Through a survey, we explored the blessings and downsides of the usage of ChatGPT in a pharmacy setting, the extent of education required to apply it effectively, and the effect on affected person care. This study will offer precious insights into the pharmacists' perceived demanding situations and possibilities of enforcing AI-powered chatbots in pharmacy practice, and tell techniques to optimize their use.

2. Methods

2.1. Study design and setting

This cross-sectional study was conducted between November and December 2024 to evaluate pharmacists' perceived challenges and opportunities to implement AI-powered chatbots (ChatGPT) in pharmacy practice. The study included Pharmacy students, practicing pharmacists, and faculty members in various countries. A convenient sampling method was used to select the participants by distributing the study questionnaire using an online platform (Email and WhatsApp).

2.2. Survey development

The preliminary takes a look at questionnaire become generated and evaluated for content material and face validity through survey experts. Minor changes have been made primarily based totally at the notes and comments provided. The remark covered terms such, "The survey is concise; kindly evaluate questions, which will be merged to lessen the whole wide variety of inquiries to make sure a better of entirety rate. as an example. The very last model of the questionnaire consisted of 4 parts.

- The first part comprised demographic characteristics of the study population.
- The second part includes Knowledge of AI and ChatGPT in Pharmacy Practice.
- The third section includes Attitudes and Perceptions towards AI and ChatGPT in pharmacy practice.
- The last part evaluates the future outlook of ChatGPT in Pharmacy Practice.

2.3. Ethical Considerations

Obtain ethics approval from Shri Indra Ganesan Institute of Medical Science, College of Pharmacy, affiliated to Dr. MGR University Chennai. Informed consent from participants. Ensure anonymity and confidentiality of responses.

2.4. Data analysis

The data analysis was conducted using MS form software, (MS Corp., Albuquerque, New Mexico, USA). A blend of inferential and descriptive statistical techniques turned into implemented relying on the character of the data. Frequency and probabilities have been computed for specific variables. The correlation among perceived advantages and worries turned into evaluated the usage of Spearman's rho correlation because of the data's non-everyday distribution. Factors related to bad notion and excessive worries had been assessed the use of the Pearson Chi-rectangular test. It turned into used to analyze institutions among participants' demographic facts and excessive perceived blessings and issues levels. The identical take a look at tested the connection among ChatGPT practices and perceptions and concerns. A p value of less than 0.05 was deemed to signify statistically significant results. Inferential Statistics: Compare knowledge/awareness across countries and professional roles using chi-square tests. Correlation analysis between awareness and willingness to adopt AI in practice. Factors related to negative belief and excessive issues had been assessed the usage of the Pearson Chi-rectangular test. It changed into used to analyse institutions among participants' demographic information and excessive perceived advantages and issues levels. The equal take a look at tested the connection among ChatGPT practices and perceptions and concerns.

3. Results

3.1. Sociodemographic Characteristics

The study included a total of 328 participants from five countries: The majority were from India (N=151,46.0%), followed by Oman (N = 55, 16.7%), London (N = 52, 15.8%), and while UAE (N = 44, 13.4%), and France (N = 20, 6.0%) made up the smallest proportion of the sample. The demographic traits of college students and school contributors collaborating withinside the observe are offered in Table 1. The majority of participants were students at the Faculty of Pharmacy (N=256, 78%), and the remaining (N=72, 22%) were faculty members at the Faculty of Pharmacy. The demographic profile of the participants in the study, as shown in Table 1, indicates that the majority of the female participants outnumbered males, with 59%(N=195) compared to 41%(N=133) respectively. Regarding educational background, the majority of participants held an Undergraduate degree (81%, N=239). When examining the participants' profession, the largest group worked in community and hospital pharmacies (22%, N=72). The level of understanding of AI's potential to transform pharmacy practice varied among participants. A small percentage (15.9%, N=52) had significant experience in pharmacy practice, whereas less than a third (19.8%, N=65) had moderate experience in same area. The largest group had high technological understanding in pharmacy practice (32.1%, N= 105) and only (23.8%, N=78) of the participants reported no prior understanding. Concerning ChatGPT, a significant proportion of participants (68.5%, N=225) reported having heard of ChatGPT.

Table 1 Participant's sociodemographic data (n=328)

Variable	Category	Count%
Gender	Male	133(40.5%)
	Female	195 (59.4%)
Degree	Undergraduate	239 (72.8%)
	Postgraduate	53 (16.1%)
	Doctorate	36 (10.9%)
Profession	Students	256 (78%)
	professionals	72 (21.9%)
The level of understanding AI's in pharmacy practice	No prior understanding	78 (23.8%)
	Basic	71 (21.6%)
	Moderate	65 (19.8%)
	High	105 (32.1%)
Have you heard of ChatGPT?	Yes	225 (68.5%)
	No	77 (23.4%)
How familiar are you with AI?	Very familiar	111 (33.8%)
	Familiar	96 (29.2%)
	Less	36 (10.9%)
	No idea	65 (19.8%)
How often do you use AI tools in your daily practice or studies?	Daily	112 (34.1%)
	Weekly	83 (25.3%)
	Monthly	49 (14.9%)
	Rarely	60 (18.2%

3.2. Perception Towards the Use of ChatGPT Benefits in Pharmacy Practice

An overview of the perception responses suggests that many participants recognized the potential benefits of using ChatGPT in the pharmaceutical sector. More specifically, the survey's highest concurrence (35.3%, n=116) came from the statement asserting that pharmacists could greatly benefit from using ChatGPT. Another area with substantial agreement (14.6%, n =48) was the use of ChatGPT for content creation like patient counselling which suggest that participants recognize the potential of AI for generating ideas for marketing materials such as blog posts and social media pharmacy post. Over two third of the participants (13.4%, n=44) agreed that ChatGPT can be used to provide educational content related to drug interaction and pharmacy products. On the other hand, less than half of the participants (10.9%, n=36) agreed that ChatGPT can provide accurate information regarding clinical decision and medicine. In addition, the use of ChatGPT to analyze patient data and provide personalized treatment recommendation based on the patient's medical history and genetic profile met with the most disagreement (42.6%). With (28.3%) of the participants being neutral it is nothing worth that it still received (27.4%) of agreement. Further examination of the results brings to light that using ChatGPT as monitoring tool for equipment performance, with the potential to detect issues before they became significant problems. Almost half of the participants (27.4%) agreed with this proposition and a considerable segment (28.3%) expressed neutrality. Regarding familiarity with AI nomenclature, the bulk of contributors had been acquainted with algorithms, device learning, the Internet of Things (IoT), and robotics, with algorithms being the maximum famous term (n=111,33.8%), while familiarity with other terms such as neural networks, deep learning, and big data was relatively low.

3.3. Attitudes Towards AI In Pharmacy Practice

The majority of the participants agreed that AI will improve and revolutionize clinical pharmacy practice (46%, n=151) and other general pharmacy sciences (35%, n=15). However, a few contributors disagreed or had impartial attitudes closer to the effect of AI on healthcare professionals. Interestingly, individuals had various critiques approximately the effect of AI on the drugstore profession. While some believed that AI would reduce the number of general pharmacists needed (55.1%, n=181), others believed that it would increase the number of specialized pharmacists needed (13.4%, n=44). None the less, a significant percentage of participants agreed that AI will never make healthcare professionals expendable (30.4%, n=100). It is essential to be aware that attitudes in the direction of AI had been now no longer uniform a number of the participants. Some saw AI as a partner that will help them perform their duties effectively (56%), while others viewed it as a competitor that will take over their jobs (13.5%). However, it was generally agreed that pharmacy students should receive teaching in AI during their study (63.7%), and teaching in AI will be beneficial for their career (27.1%). When asked to indicate the specialty most likely to be impacted by AI in the near future, the highest percentage of responses answered pharmaceutical statistics (27.4%), followed by drug design (32.6%).

3.4. The correlation between recognized benefits of ChatGPT and identified concerns

Table 2 illustrates the correlation between perceived benefits and concerns. The spearman's rho correlation coefficient is 0.255($p<0.001$), with a significance level of $p<0.001$. the indicates a statistically significant positive correlation, albeit weak, between the perceived benefits of ChatGPT and its concerns that is statistically significant.

Table 2 Correlation Between Perceived Benefits and Concerns

			Perceived benefits	**Perceivedconcerns**
Spearman's rho	Perceived benefits	Correlation coefficient	1000	0.255
		p value		<0.001*
	Perceived concerns	Correlation coefficient	0.255	1000
		p value	<0.001*	

3.5. Usefulness of using ChatGPT compared to other standard resources

Figure 1 further delves into the perceived usefulness of ChatGPT among those who have employed it in their pharmaceutical practice, comparing it to standard resources. For those who utilized ChatGPT to check for drug-drug interactions, an overwhelming 13.4% found it to be more or equally helpful. Similarly, among the pharmacist who used ChatGPT as a drug and disease source, approximately 35.3% reported it to be as useful as, or more beneficial than, conventional resources (e.g., UpToDate, Medscape, Lexicomp, therapy Text books, etc.)

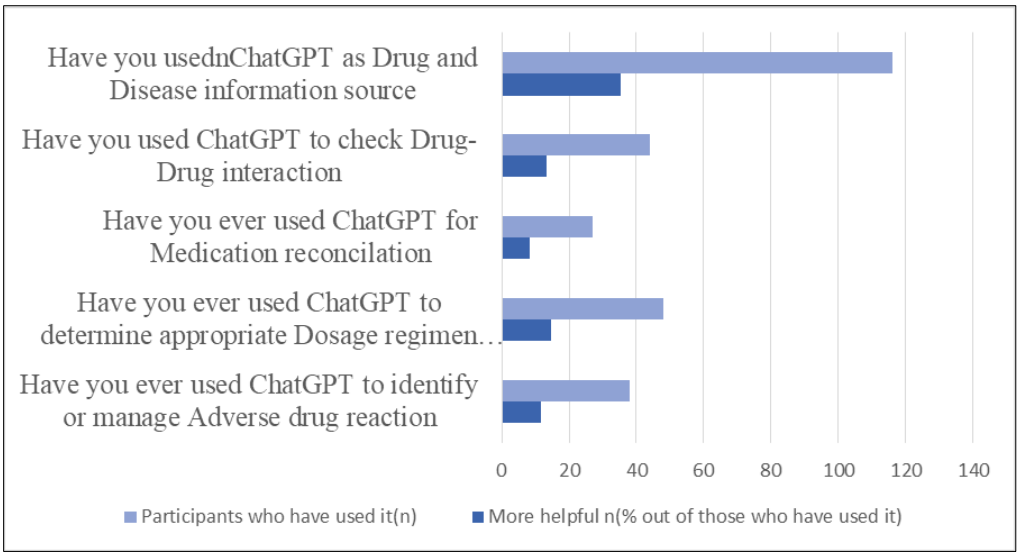

Figure 1 Usefulness of using ChatGPT compared to other standard resources

For meditation reconciliation, a task performed by 27 participants, a significant proportion (8.2%) found ChatGPT either equally useful or superior to human-made decisions. The utility of ChatGPT was also recognized in determining appropriate dosage regimens for patients, with 14.6% of the 48 participants who used it for this purpose acknowledging its value. Interestingly, the very best percent of effective responses became mentioned for handling or figuring out negative drug reactions. Here, an impressive 11.5% of the 38 users reported that ChatGPT was as good as or better than traditional sources.

3.6. Association between ChatGPT practice and participants perceptions and concerns

The information displays a statistically sizable affiliation among the frequency of ChatGPT use and wonderful perceptions of the tool (p<0.001). Those who used it frequently had a higher percentage (34.1%) of good perception compared to those who used it occasionally (25.3%), rarely (18.2%), or never (4.5%). In other words, the more favorably they viewed it. When considering the recommendation of ChatGPT to other pharmacists, those who would recommend it had a significantly higher percentage (46.0%) of good perception compared to those who would not recommend it (17.0%) (p=0.001).For specific applications of ChatGPT in pharmacy practice, participants who used it to check for drug-drug interactions, as a drug and disease information source, for medication reconciliation, to determine appropriate dosage regimens for patients, or to identify or manage adverse drug reactions all had significantly a higher percentage of good perception compared to those who have not use it (p=0.001).The data paints a slightly different picture of the association between ChatGPT practices and concerns. Interestingly, the survey date showed that those who did not favor recommending ChatGPT had noticeably more concerns than those who would recommend it. This difference was statistically significant, with a high 92.9% of the non-recommenders expressing high concerns, compared to 79.2% among those advocating for the tool (p<0.001).

4. Discussion

Findings from this look at ought to be taken into consideration cautiously in mild of a few limitations. The questionnaire was distributed online; therefore, data were collected only from pharmacists and pharmacy students who use the Internet and other social media platforms were able to participate, and All data on this have a look at became acquired thru the self-record method, main to a danger of social desirability bias or don't forget bias. Findings from this study showed that Indian pharmacists positively endorse the benefit and the bright future of using ChatGPT as a tool compared to the available standard resources. However, it's far vital to make clear that obstacles and concerns, along with moral considerations, criminal and privateness issues, the accuracy of the generated statistics, statistics learning, and chance of Bias should be all addressed earlier than extensively imposing ChatGPT in pharmaceutical and healthcare. The results of this study would help healthcare providers and policymakers in India and comparable global countries gain more insight about using ChatGPT in pharmacy practice, thus allowing them to react with the aid of using defining the limitations and facilitators to its feasible complete implementation withinside the future, if any.

5. Conclusion

Although there may be slight understanding and high-quality attitudes closer to AI in pharmacy practice, there may be nevertheless room for development in integrating AI schooling into pharmacy curricula and practice. The observe underscores the significance of non-stop expert improvement in AI for each college students and school contributors to make certain their readiness for the evolving healthcare landscape. The findings of this look at confirmed that pharmacists have a tremendous endorsement of using ChatGPT in pharmacy exercise however have issues associated with moral considerations, felony and privacy issues, the accuracy of the generated statistics, statistics learning, and threat of bias. Future research, inclusive of different healthcare providers, have to be conducted, and greater tremendous research have to discover facilitators and obstacles to enforcing ChatGPT in fitness and pharmacy practice

Compliance with ethical standards

Acknowledgments

I convey my acknowledgement to the management of Shri Indra Ganesan Institute of Medical Science College of Pharmacy, Manikandam, Tiruchirappalli, Tamil Nadu, India.

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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Authors short Biography

I am (Gayathri Sharmili RS) a passionate writer from Tiruchirappalli, Tamil Nadu, with a deep interest in the evolving role of artificial intelligence in the pharmacy field. I have always been driven by a desire to contribute to the advancement of pharmacy practices. With a background in **Bachelor of Pharmacy**, I'm committed to integrating technology into healthcare. My writing journey began with a profound interest in **clinical research** and an aspiration to create awareness about the intersection of **AI chatbots** and pharmacy. Recognizing the potential for AI to revolutionize pharmacy practices, my writing aims to educate and inform about its benefits and applications. Through my work, I hope to bridge the gap between emerging technology and pharmacy professionals, promoting the adoption of AI solutions for better patient care and more efficient practices. I'm currently focused on projects that raise awareness of the use of **AI chatbots and ChatGPT** in pharmacy, highlighting their relevance to the profession. My ultimate goal is to help refine AI chatbots, ensuring they provide **accurate answers with zero errors**, transforming the way pharmacy professionals interact with technology. Driven by a commitment to continuous learning and innovation, I strive to make meaningful contributions to the field of pharmacy through my writing and future advancements in AI.