Asian J Biol Life Sci., 2025; 14(3):541-546.
https://ajbls.com

Review Article

Artificial Intelligence in Medical Prescription: Revolution, Risks and Future Aspects

Shital Chaudhari*, Tularam Barot

Department of Pharmaceutical Technology, Parul Institute of Pharmacy and Research, Parul University, Vadodara, Gujarat, INDIA.

ABSTRACT

The integration of Artificial Intelligence (AI) into medical prescription systems has transformed modern medicine. With tools such as DrugGPT and Clinical Decision Support Systems (CDSS), AI helps clinicians evaluate patient data more effectively, select medications, and prevent medication errors. This review examines the current landscape of AI-driven prescribing, highlighting benefits like increased efficiency, accuracy, cost savings, and greater accessibility of prescriptions. It also discusses important advancements such as machine learning, natural language processing, and Retrieval-Augmented Generation (RAG), each contributing to better, insight-driven healthcare decisions. However, using AI also entails certain risks. We must carefully address issues like data privacy, ensure transparency in AI operations, prevent unfair biases, and maintain accountability. Most importantly, we must protect and nurture human empathy within our healthcare system. Achieving this requires thoughtful regulatory frameworks such as the European Union AI Act, the Health Insurance Portability and Accountability Act, and India's Digital Personal Data Protection Act. A hybrid approach combining human oversight with AI efficiency appears to be the safest and most sustainable path forward. The future of AI in prescribing involves federated learning, human-in-the-loop systems, and expanded use in underserved regions, ensuring ethical, secure AI-powered healthcare and safeguarding individuals.

Keywords: AI Regulations, Artificial Intelligence in Medicine, Clinical Decision Support System, Retrieval Augmented Generation.

Correspondence:
Shital Chaudhari
Department of Pharmaceutical Technology, Parul Institute of Pharmacy and Research, Parul University, Vadodara-391760, Gujarat, INDIA.
Email: shitalc779@gmail.com

Received: 11-09-2025;
Revised: 29-10-2025;
Accepted: 02-12-2025.

INTRODUCTION

Medicine is changing big time because of AI and automation. We are at a point where these new technologies could change how doctors and patients interact and how healthcare is given.[1] AI automation could make medicine more data-based, more efficient, and easier to get, but it could also make it feel less personal. As we automate things like radiology and surgery, we need to think about what doctors and patients could lose or gain.[2] AI is basically a computer system that act like humans. They can do things like understand language, learn, plan, and solve problems, which usually takes a human brain. AI and automation could make medicine better and still keep it human.[3] However, without proper caution, we risk harming the core of medicine. Oxford University has created a new AI tool that aims to address both issues. Besides providing information that helps patients understand why and how to take medications, DrugGPT offers a safety net for doctors when prescribing them. AI and automation can make medicine more effective for everyone.[4,5] Consider the benefits, risks, and future impacts of AI and automation to improve healthcare for all. Let's explore the positives, the risks, and what the future might hold with AI and automation for everyone in healthcare, such as doctors, patients, administrators, and policymakers.[1,2] AI systems that provide personalized advice could significantly transform medicine by making care more accessible, affordable, and improved, while also supporting both doctors and patients. The prescription pathway by using AI has been shown in Figure 1.[6]

In the future, it is anticipated that Retrieval-Augmented Generation models, which blend reasoning with real-time literature searches, will quickly bridge knowledge gaps. [2, 3] Moreover, as Electronic Health Records (EHRs) and AI become more transparent, especially in high-risk or resource-limited environments, AI is likely to become a reliable co-pilot in clinical prescribing.[7,8] Historical evaluation of the AI has been depicted in Figures 1 and 2.

TOOLS OF AI IN PRESCRIPTION

Machine learning

Computer systems can recognise patterns in previous medical data and make decisions or predictions without needing to

DOI: 10.5530/ajbls.20250039

be explicitly programmed for each task, thanks to a subfield of artificial intelligence known as machine learning.

Prescription drugs contain ML to:

- Predict the appropriate medications based on the diagnosis, lab results, and clinical history.
- Optimise dosages by personalised parameters like weight, age, and kidney function.
- Identify Any Potential Side Effects (ADRs) or drug interactions.
- Personalise therapeutic choices for long-term illnesses such as diabetes, high blood pressure, cancer, etc.[9]

Natural Language Processing (NLP)

Computers are aided in understanding, making sense of, and even creating human language by Natural Language Processing (NLP), a subfield of Artificial Intelligence (AI). To interpret everyday texts, such as doctors' notes, summaries after hospital stays, patient reports, and medical writing, it combines the study of language with how computers learn.[10]

Clinical Decision Support System (CDSS)

Clinical Decision Support Systems (CDSS) serve as a trusted partner, empowering clinicians to make the best possible decisions for their patients. By utilising patient-specific tools that merge each patient's unique story with the latest medical insights, CDSS ensures personalised and effective care. These systems utilise intelligent tools that draw on extensive medical knowledge and assist clinicians in navigating complex cases, much like a seasoned colleague.[11]

Retrieval augmented generation

RAG and how they affect overall performance in different ways. There is a component that is not present in our comprehension of RAG. Our paper conducts a comprehensive investigation of the RAG framework, beginning with the design of RAG models from the ground up with a focus on the modularity and replaceability of its constituent modules. This study aims to advance our understanding of RAG's mechanisms and its potential to improve AI's ability to comprehend and create language in a manner comparable to that of humans.[12]

LEGAL AND ETHICAL CONFINES OF AI IN MEDICAL PRESCRIPTION

Data sequestration

Nations around the world, especially the United States, are committed to ensuring that sensitive case data is handled securely with AI systems. AI integrated into the health system is covered by HIPAA (USA) legislation. US AI technologies must adhere to strict identification processes and controls over patient sequestration, accounts, and access to specific information to prevent breaches. GDPR aims to limit data collection, promote transparency, and enable individuals to understand the reasons behind significant decisions. Regarding AI-enabled prescribing, Article 22 of GDPR addresses automated fairness in decision-making. The Digital Personal Data Protection Act of 2023 restricts the use of certain data to specific, defined governance.[17]

AI as a Medical Device

US FDA (U.S): The US Food and Drug Administration (FDA) has issued a structured action plan for Artificial Intelligence and Machine Learning-based Software as a Medical Device that authorizes.

- Clinical confirmation through prospective trials or real-world substantiation.
- Translucency in the model sense and data sources.
- Post request surveillance of algorithmic performance and safety European Union (EU).

European Union (EU): The AI Act 2024 is a regulation on Artificial Intelligence (AI) that was passed in 2024. It's the first of its kind, encompassing AI regulation issued by a major controller anywhere differently. [18]

The Act assigns operations of AI to three threat orders

First, operations and systems that pose an inferior threat are outlawed, similar to Chinese government-run social scoring. Alternatively, high-threat operations must meet certain legal conditions, like a CV-surveying tool that ranks job aspirants. Incipiently, operations not explicitly banned or listed as high-threat are largely left limited. In 2024, the EU AI Act established a comprehensive non-supervisory framework that classifies AI operations used in healthcare as" high-threat operations," particularly those used in diagnostics or defining.[18]

The legal framework

- Requires mortal oversight of the decision.
- Requires algorithmic labour to be resolvable.
- Requires inventors and healthcare institutions to be transparent and have plans for threat operations.[13-15]

The Black- Box Issue and Explainability

Numerous AI systems, similar to LLMs and ChatGPT or DrugGPT, operate as "black boxes," furnishing labour devoid of explanations grounded on the internally reused information. Life-critical opinions like defining specifics punctuate the trust gap stemming from a lack of explainability. A new action called

"resolvable AI" (XAI) attempts to make AI opinions transparent and auditable.[14]

Responsibility Croaker versus inventor versus Others

In utmost authorities, the responsibility falls on croakers. AI is a support tool and not a cover. Liability may attach to inventors if detriment is caused as a result of a software bug or prejudiced training data. Hospitals/ Institutions must ensure acceptable confirmation, AI threat assessment, attestation, training, and compliance with institutional programs before AI deployment.[16]

RISKS AND LIMITATIONS OF AI

Ethical Gaps and Impulses

AI tools trained on prejudiced or unrepresentative data can support healthcare differences. Gender, race, and class impulses that have been proven in medical AI tools lead to inequitable treatment recommendations. Cost-effective options suggested by AI may pose ethical dilemmas as they could be fiscally smart but innocently fantastic.[18]

Absence of Empathy and Contextual Understanding

AI lacks the ability to understand human feelings, suspicion, and psychosocial basics. The Black-Box Problem and Explainability are key issues. Many AI systems, especially large language models like ChatGPT and DrugGPT, operate as "black boxes," providing outputs without clear explanations of how decisions are made. This lack of transparency undermines trust, especially in life-critical decisions like medical conventions. Comparison of human and AI in prescription writing is depicted in Figure 3. A growing field called explainable AI (XAI) aims to make AI's decisions auditable and transparent.[17]

Responsibility Croaker Vs. Inventor

In mature authorities, critics eventually bear responsibility. AI must be considered an adjunct, not a substitute. Inventors may face liability if a software bug or biased training data causes harm. Hospitals and institutions must ensure proper validation, verification, and training before deploying AI.[18]

High Risk of Overreliance

There are reports that clinicians are likely to over-trust the results of AI labours, especially when fatigued or pressed for time.

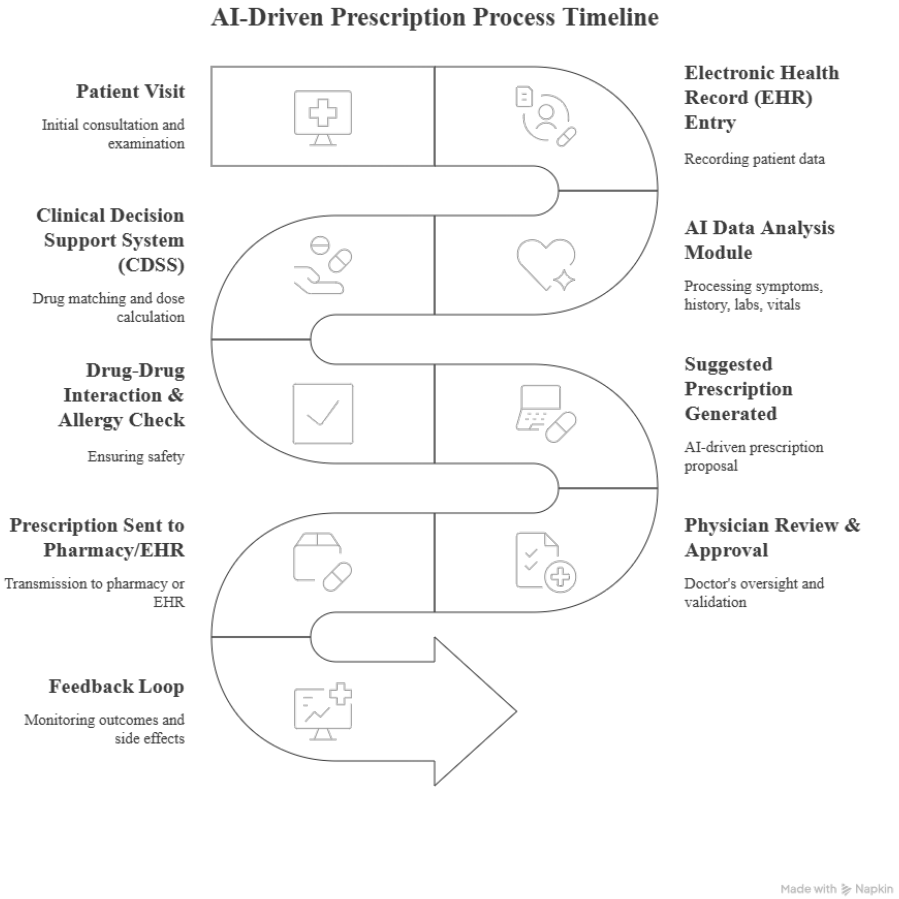

Figure 1: Prescription pathway.

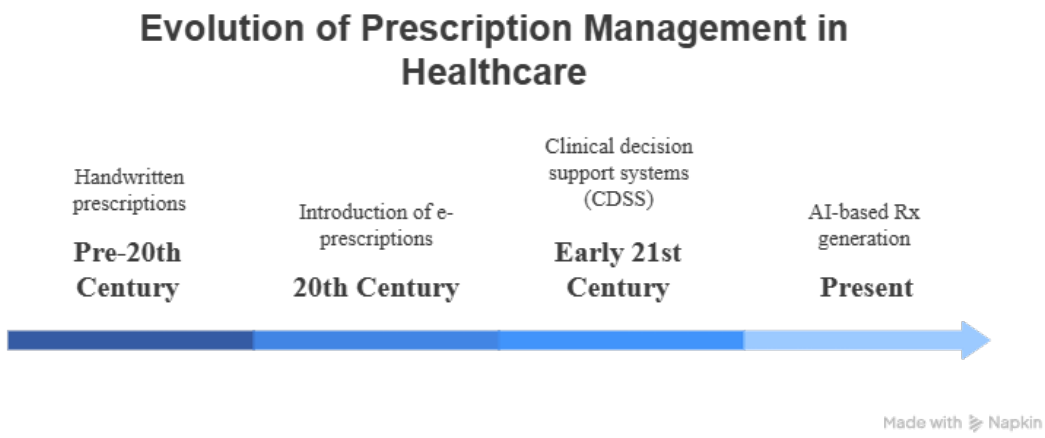

Figure 2: Historical Timeline.

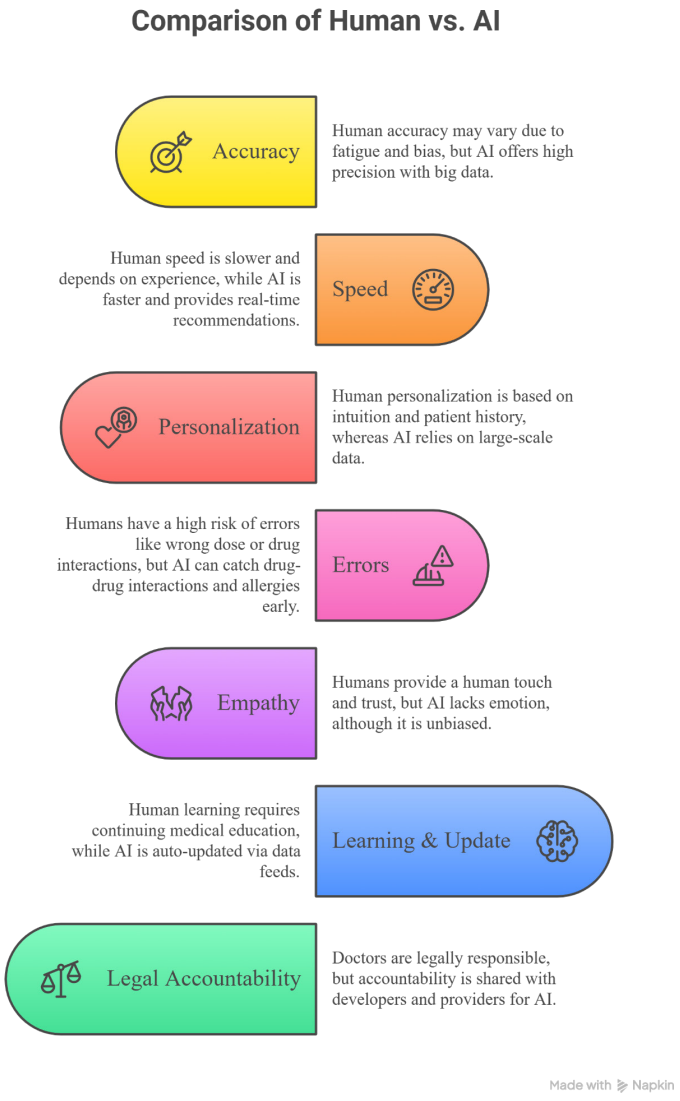

Figure 3: Comparison between Human and AI.

Overreliance contributes to the deterioration of critical clinical thinking chops and sound clinical judgment. Mortal-in-the-circle systems are suggested to maintain a balance of effectiveness and oversight.[17]

FUTURE VISION AND ROADMAP

Hybrid Model AI Croaker Collaboration

The role of the croaker won't be eliminated with the increase in AI technologies; instead, they will be improved as decision support tools powered by AI. AI will handle data-intensive tasks such as relations, genomics, or EHRs surveys, while clinicians retain the final authority, ensuring empathy-based care. This model maintains moral empathy and responsibility, which improves safety and trust.[19]

Human-in-the-Loop (HITL) Defining

HITL designates that all recommendations produced by AI must be annotated by a mortal for blessing or disapproval. Promotes better case issues, decreases liability, and makes environment-apprehensive opinions possible. Physicians are responsible; others honour institutional or inventor liability.[20]

Federated Learning and sequestration-First AI

Traditional AI requires a centralised data storehouse, posing security pitfalls. Federated learning enables AI models to learn to learn from decentralised health data without transferring raw data, perfecting sequestration and reducing compliance pitfalls. Used in early airman systems by Google Health and OpenAI LLMs in medical exploration.[21]

AI in Rural/Low-Resource Areas

AI could help bridge the deficit of the mortal clinical pool in underserved areas. Chatbots and AI- grounded tradition platforms can support the healthcare labour force for the selection of drugs, boluses, and diagnostics. Mobile-enabled LLM tool (medicine GPT Lite) is being tested in India and Sub-Saharan Africa to serve frontline health workers. Live language restatement and AI interfaces acclimatised to different societies make the press more accessible.[22]

CONCLUSION

Intelligence is gradually transforming the way we prescribe medication. AI is beginning to take a growing role in the type of care we receive and how we receive it, from supporting clinical decisions to personalised treatment plans, and the wider issue of the general safety of healthcare. Tools such as machine learning, natural language processing, clinical decision support systems, and retrieval-augmented generation are allowing doctors to make more educated decisions drawn from a broader range of patient data than ever. The speed at which AI is being integrated into patient care must be matched with careful human values, clear principles, and proper, reliable assurance. Developers, healthcare institutions, and clinicians must each embrace their roles. Data privacy cannot be an afterthought; it must be fundamental to every step, in line with international laws and community needs. AI can be a powerful partner in enhancing patient safety in prescriptions, streamlining medication access, and making prescriptions more readily available, especially in parts of the world where healthcare is difficult to access.

ABBREVIATIONS

AI: Artificial Intelligence; **CDDS:** Clinical Decision Support System; **RAG:** Retrieval Augmented Generation; **EHRs:** Electronic Health Records; **ML:** Machine Learning; **NLP:** Natural Language Processing; **DPDP:** Digital Personal Data Protection; **FDA:** Food and Drug Administration; **LLMs:** Large Language Models; **XAI:** Explainable Artificial Intelligence.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORS CONTRIBUTIONS

All authors have contributed equally for this review paper.

SUMMARY

Artificial intelligence is transforming the process of prescribing medicines, making healthcare more precise, efficient, and accessible. DrugGPT, Clinical Decision Support Systems, machine learning, and retrieval-augmented generation are some of the tools that doctors can use to analyze patient data better and make decisions. However, these advantages come with legitimate worries about things like data privacy, the loss of human connection, and biased algorithms. AI should be used as a complement rather than a replacement for doctors in the treatment process. Combining human wisdom with AI power through models like Human-in-the-Loop systems, federated learning, and expanding AI access to underserved areas are the keys to the future. AI has the potential to build trust, increase safety, and bring high-quality medicines to every corner of the globe if used wisely.

REFERENCES

1. George AH, George AS. From pulse to prescription: exploring the rise of AI in medicine and its implications. Partners Universal International Innovation Journal. 2023; 1(6): 38-54.
2. Agrawal M, Mishra V, Jogani HS, Kashyap P. A Review of Artificial Intelligence in Medical Prescription Analysis. Int Conf on Perv Comp and Soc Net. 2023; 1(1): 35-43.
3. Alsanosi SM, Padmanabhan S. Potential Applications of Artificial Intelligence (AI) in Managing Polypharmacy in Saudi Arabia: A Narrative Review. Healthcare (Basel). 2024; 12(7): 788.
4. Reis ZSN, Pagano AS, Ramos de Oliveira IJ, Dias CDS, Lage EM, Mineiro EF, Varella Pereira GM, *et al.* Evaluating Large Language Model-Supported Instructions for Medication Use: First Steps toward a Comprehensive Model. Mayo Clin Proc Digit Health. 2024; 2(4): 632-44. Doi: 10.1016/j.mcpdig.2024.09.006. PMID: 39679140; PMCID: PMC11638470.
5. Roosan D, Padua P, Khan R, Khan H, Verzosa C, Wu Y. Effectiveness of ChatGPT in clinical pharmacy and the role of artificial intelligence in medication therapy

management. J Am Pharm Assoc (2003). 2024; 64(2): 422-8.e8. Doi: 10.1016/j.japh. 2023.11.023.

6. Hadweh P, Niset A, Salvagno M, Al Barajraji M, El Hadwe S, Taccone FS, Barrit S. Machine Learning and Artificial Intelligence in Intensive Care Medicine: Critical Recalibrations from Rule-Based Systems to Frontier Models. J Clin Med. 2025; 14(12): 4026.
7. Baker A, Perov Y, Middleton K, Baxter J, Mullarkey D, Sangar D, Butt M, DoRosario A, Johri S. A Comparison of Artificial Intelligence and Human Doctors for the Purpose of Triage and Diagnosis. Front Artif Intell. 2020; 3: 543405.
8. Giroux M, Kim J, Lee JC, Park J. Artificial Intelligence and Declined Guilt: Retailing Morality Comparison between Human and AI. J Bus Ethics. 2022; 178(4): 1027-41. Doi: 10.1007/s10551-022-05056-7.
9. Kühl N, Schemmer M, Goutier M, Satzger G. Artificial intelligence and machine learning. Electronic Markets. 2022; 32(4): 2235-44.
10. Klug K, Beckh K, Antweiler D, Chakraborty N, Baldini G, Laue K, *et al.* From admission to discharge: a systematic review of clinical natural language processing along the patient journey. BMC Med Inform Decis Mak. 2024; 24(1): 238. Doi: 10.1186/ s12911-024-02641-w.
11. Elhaddad M, Hamam S. AI-Driven Clinical Decision Support Systems: An Ongoing Pursuit of Potential. Cureus. 2024; 16(4): e57728. Doi: 10.7759/ cureus. 57728.
12. Amugongo LM, Mascheroni P, Brooks S, Doering S, Seidel J. Retrieval augmented generation for large language models in healthcare: A systematic review. PLOS Digit Health. 2025; 4(6): e0000877.
13. Conduah AK, Ofoe S, Siaw-Marfo D. Data privacy in healthcare: Global challenges and solutions. Digit Health. 2025; 11: 20552076251343959. Doi: 10.1177/20552076 251343959.
14. Vardas EP, Marketou M, Vardas PE. Medicine, healthcare and the AI act: gaps, challenges and future implications. Eur Heart J Digit Health. 2025; 6(4): 833-9. Doi: 10.1093/ehjdh/ztaf041.
15. Freyer N, Groß D, Lipprandt M. The ethical requirement of explainability for AI-DSS in healthcare: a systematic review of reasons. BMC Med Ethics. 2024; 25(1): 104. Doi: 10 .1186/s12910-024-01103-2.
16. Bottomley D, Thaldar D. Liability for harm caused by AI in healthcare: an overview of the core legal concepts. Front Pharmacol. 2023; 14: 1297353.
17. Hildt E. What Is the Role of Explainability in Medical Artificial Intelligence? A Case-Based Approach. Bioengineering (Basel). 2025; 12(4): 375. Doi: 10.3390/bioen gineering12040375.
18. Fan L, Deng K, Liu F. Educational impacts of generative artificial intelligence on learning and performance of engineering students in China. Sci Rep. 2025; 15(1): 26521.
19. Hirosawa T, Suzuki T, Shiraishi T, Hayashi A, Fujii Y, Harada T, Shimizu T. Adapting Artificial Intelligence Concepts to Enhance Clinical Decision-Making: A Hybrid Intelligence Framework. Int J Gen Med. 2024; 17: 5417-5422.
20. Kabata F, Thaldar D. Human in the loop requirement and AI healthcare applications in low-resource settings: A narrative review. S Afr J Bioeth Law. 2024; 17(2): 70-3.
21. Teo ZL, Jin L, Liu N, Li S, Miao D, Zhang X, *et al.* Federated machine learning in healthcare: A systematic review on clinical applications and technical architecture. Cell Rep Med. 2024; 5(3): 101481.
22. Lamem MF, Sahid MI, Ahmed A. Artificial intelligence for access to primary healthcare in rural settings. J Med Surg Public Health. 2025; 5(2): 100173.

Cite this article: Chaudhari S, Barot T. Artificial Intelligence in Medical Prescription: Revolution, Risks and Future Aspects. Asian J Biol Life Sci. 2025;14(3):541-6.