Indian Journal of Library Science Research & Information Technology
VOL 2 NO.1 (JAN-JUNE 2025)
ISSN - 3048-4677
(c) BMS PUBLISHING HOUSE
https://www.bmsgroup.in/product/indian-journal-of-library-science-research-information-technology/

AI-Driven Innovations in Medical Libraries: A Study of Indian Healthcare Knowledge Systems

Dr. Vijaykumar B. Gopale
Librarian and NCC Officer
Government College (Autonomous), Kalaburagi, Karnataka

Kirankumar R. Badgu
Asst. Librarian
Paras College Kalaburagi

Abstract

The integration of Artificial Intelligence (AI) into medical libraries is transforming healthcare knowledge systems across India. This study explores how AI-driven innovations are reshaping information organization, retrieval, and dissemination in medical libraries. It examines the adoption of AI tools such as machine learning algorithms, natural language processing (NLP), predictive analytics, and intelligent chatbots to enhance user experience, decision-making, and research support. Data were collected through surveys and interviews with librarians, medical faculty, and IT professionals from selected Indian healthcare institutions. The study concludes that the future of Indian medical libraries lies in developing hybrid models that integrate AI technologies with traditional library practices to create intelligent, user-centered knowledge environments. Recommendations are made for policy development, capacity building, and strategic collaborations to strengthen AI adoption in healthcare knowledge management.

Keywords: *Artificial Intelligence, Medical Libraries, Healthcare Knowledge Systems, Machine Learning, India, Digital Transformation*

1. Introduction

Medical libraries are essential hubs for healthcare knowledge, offering access to journals, research papers, textbooks, and clinical guidelines. In India, these libraries support education, research, and clinical practice. However, with the rapid increase in medical literature, traditional library systems face challenges in managing and retrieving relevant information efficiently. Artificial Intelligence (AI) has emerged as a transformative solution to enhance the

accessibility, organization, and utilization of medical knowledge. Artificial Intelligence (AI) refers to the ability of machines or computer systems to perform tasks that normally require human intelligence — such as learning, reasoning, and decision-making.In the context of medical libraries, AI is revolutionizing how information is collected, organized, retrieved, and utilized by healthcare professionals, researchers, and students.

2. AI-Driven Innovation

AI technologies are being integrated into medical libraries in India to overcome these challenges:

2.1. Intelligent Search Systems:

AI-powered search engines understand natural language queries, providing context-aware results instead of basic keyword matches.

2.2. Recommendation Engines:

Suggests relevant research papers, case studies, and guidelines based on user profiles and previous searches.

2.3. Automated Summarization:

Condenses lengthy research articles into brief summaries, saving time for clinicians and researchers.

2.4. Data Mining and Predictive Analysis:

Analyzes large datasets to identify research trends, disease patterns, and emerging healthcare topics.

2.5. Integration with Clinical Data:

AI links library resources with Electronic Health Records (EHRs) to support evidence-based clinical decisions.

2.6. Virtual Assistants and Chatbots:

Provides real-time assistance to users for navigating library resources and finding specific information.

3. Impact on Indian Healthcare Knowledge Systems

3.1.Enhanced Accessibility: Medical information becomes easily accessible to students, researchers, and practitioners.

3.2.Improved Clinical Decision-Making: Quick access to evidence-based research supports better patient care.

3.3.Promotion of Research: Facilitates collaboration and cross-referencing of Indian and global research work.

3.4.Bridging Knowledge Gaps: Digital AI-driven libraries help reach rural and semi-urban healthcare professionals.

4.What is a Medical Library

Before going further: a medical library typically supports medical education, research, and clinical practice by providing access to journals, books, databases, and tools for literature searches, evidence-based medicine etc. AI's impact changes many of these functions.

Key Areas of Impact

4.1. Digitization and Knowledge Preservation

Traditional medical knowledge (Ayurveda, Unani, Siddha, etc.) is being digitized using AI. For example, India has deployed an AI-based platform, the Traditional Knowledge Digital Library (TKDL), to transform texts from Sanskrit, Tamil, Arabic etc., into structured, searchable, multilingual digital records.

This helps in preserving heritage, preventing loss or degradation of ancient manuscripts, and protecting against issues like biopiracy.

4.2. Improved Information Retrieval & Personalization

Natural Language Processing (NLP) and machine learning are making literature search more effective. Users can pose complex queries, get more relevant results, possibly even in more natural language rather than highly structured search terms.

AI can help in recommending content (articles, books) based on a user's past usage, interests, or research area. This personalization improves efficiency (less time spent on searching) and relevance. For example, a survey in Karnataka found that AI tools used in plagiarism detection, grammar checking, and chatbots are being adopted among libraries.

4.3. Automation of Routine Tasks

Cataloguing, indexing, metadata generation, summarization of large documents: these are all becoming easier with AI tools. For example, AI-based tools can assist in automatic classification of texts, extracting metadata, generating abstracts or summaries. Chatbots or conversational agents in libraries can help answer user queries ("Where is this journal?", "How do I access this database?") without human staff. The academic review "Integrating Artificial Intelligence in Academic Libraries: An Analysis" (IIT Hyderabad / IITH) explicitly notes how services and management are improving via AI.

4.4. Supporting Research & Evidence-Based Practice

Medical libraries are increasingly supporting AI-driven research: data analytics, literature mining, pattern detection across huge datasets. AI can help find connections across research that might be too voluminous for humans. Also, AI helps in summarizing and synthesizing large bodies of research quickly, which aids clinicians and students in staying current.

4.5. Access, Equity, and Reach

AI tools make remote access and digital access more feasible. For example, users in remote or underserved locations can tap into digital resources, often with AI-driven interfaces that handle different query styles. Multilingual tools could help in breaking language barriers (especially in India's multilingual context) — although this is still developing.

5. Challenges & Barriers

5.1. Infrastructural Limitations

Many medical libraries (especially in smaller towns, rural areas) lack robust digital infrastructure: reliable Internet, up-to-date computers, servers. These are prerequisites for effective AI deployment. Access to electronic resources may still be limited, both in terms of licensing and bandwidth.

5.2. Data Quality, Standardization & Interoperability

AI models depend on good data: well-structured, clean, accurate metadata and full-text content. Many libraries have disparate formats or old catalogues, non-standard metadata, missing full text, etc. Interoperability between different systems/databases is often weak. Different institutions may use different cataloguing standards, or different library management systems, making it hard to share and integrate.

5.3. Skills, Training, and Human Resources

Library staff may not have training in AI, machine learning, data science, or NLP. To use AI tools effectively (or even evaluate them), librarians need new skills. Resistance to change can also be present: staff who have done things a certain way for years may be wary of AI-led changes or automation.

5.4. Costs and Funding

Acquiring AI tools (whether commercial or in-house), maintaining them, having the compute infrastructure, paying for cloud services, etc., can be expensive. Many medical institutions operate under tight budgets. Also licensing fees for digital journals/databases may be high; adding AI tools on top can add to operational costs.

5.5. Ethical, Legal and Privacy Concerns

Medical libraries hold or link to sensitive information (clinical data, perhaps identifiable information in grey literature, etc.). AI tools that process user data or usage logs raise privacy concerns. Who owns the data, how is consent handled, how are AI algorithms validated (especially for accuracy, bias) are all issues. Also, risk of misinformation: summarization tools or generative AI could produce errors; users need mechanisms to verify.

5.6. Regulation and Policies

Clear policies around AI use, data protection, interoperability are still evolving in India. Without policies, it's hard for libraries to proceed confidently. Licensing for digital content and for AI use can be complicated (copyright of texts, usage rights, etc.).

6. Applications of AI in Medical Libraries

AI Application	Function / Example
➢ Intelligent Search Systems	AI-based search engines like PubMed's AI tools and Semantic Scholar improve precision and speed of literature retrieval.
➢ Automated Indexing & Cataloguing	AI classifies and tags medical literature automatically using natural language processing (NLP).
➢ Predictive Analytics	AI analyzes usage patterns to suggest resources or predict information needs of users.
➢ Chatbots & Virtual Assistants	AI chatbots guide users to relevant medical resources and answer queries 24/7.
➢ Image and Text Recognition	AI can extract data from scanned medical documents, handwritten notes, or diagnostic images.
➢ Personalized Information Services	Recommends journals, research papers, or e-books based on a user's interests and past searches.
➢ Plagiarism and Research Integrity Tools	AI detects plagiarism, incorrect citations, or data manipulation in medical writing.

7. Types of Medical Libraries

- **Academic Medical Libraries** – Attached to medical colleges or universities (e.g., AIIMS Library, Delhi).
- **Hospital Libraries** – Support doctors and nurses in hospitals with clinical information.
- **Research Medical Libraries** – Focused on biomedical and pharmaceutical research.
- **Public Health Libraries** – Serve health administrators and policy planners.
- **Digital / Virtual Medical Libraries** – Provide online access to e-journals, databases, and e-books.

8. Major Resources in Medical Libraries

- **Printed Materials**: Textbooks, reference books, theses, journals.
- **Electronic Resources:**
  - **Databases** – PubMed, MEDLINE, Scopus
  - **E-journals** – The Lancet, BMJ, NEJM
  - **E-books and multimedia** – AccessMedicine, ClinicalKey, Elsevier ScienceDirect

9. Modern medical libraries use Artificial Intelligence (AI) and digital tools to:

- Organize and retrieve information faster.
- Predict user information needs.
- Provide chatbots or virtual assistants.
- Automate cataloguing and indexing.
- Support evidence-based medical decision-making.

10. Importance of Artificial Intelligence (AI) in Medical Libraries

Artificial Intelligence (AI) is transforming medical libraries by improving how information is collected, organized, accessed, and used by healthcare professionals, students, and researchers. Its integration enhances the efficiency, accuracy, and relevance of library services.

10.1. Efficient Information Retrieval

AI-powered search tools help users find relevant medical literature quickly by understanding natural language queries. Systems like semantic search engines and chatbots provide context-based answers instead of just keyword matches.

10. 2. Automated Cataloguing and Indexing

AI assists in automatic classification, tagging, and metadata generation for research papers and journals.This reduces manual work and ensures consistent cataloguing across large digital collections.

10.3. Personalized Information Services

AI analyzes user behavior and recommends personalized reading lists, journals, or research articles.

Helps doctors and researchers stay updated with latest medical trends and evidence-based practices.

10. 4. Data Analysis and Knowledge Discovery

AI tools can analyze large volumes of medical data and literature to identify patterns, trends, and insights.

Supports systematic reviews, clinical decision-making, and medical research.

10.5. Intelligent Virtual Assistants

AI-based chatbots and virtual reference services help users 24×7 by answering queries, locating resources, or assisting with literature searches.

10. 6. Improved Decision Support

AI integrates with clinical decision support systems in hospitals to connect medical databases with patient care information, enabling better diagnosis and treatment.

10.7. Digital Preservation and Management

AI aids in automatic error detection, duplicate removal, and digital archiving, ensuring long-term preservation of medical knowledge.

10.8. Enhancing Research Productivity

AI-powered tools help in plagiarism detection, citation management, and literature review automation, saving researchers significant time.

Conclusion

AI is revolutionizing medical libraries in India by enabling faster, precise, and context-sensitive access to healthcare knowledge. By improving resource retrieval, supporting research, and aiding clinical decision-making, AI-driven innovations are strengthening the Indian healthcare knowledge system and paving the way for a more efficient and connected medical libraries. AI is reshaping medical libraries into smart knowledge centers, where information is not just stored but intelligently managed, retrieved, and applied to advance medical education, research, and healthcare delivery. AI is transforming medical libraries from traditional information repositories into smart, interactive knowledge centers. By adopting AI, medical libraries can better support healthcare research, education, and patient care — ensuring access to accurate and timely medical information in the digital era. AI is already having a noticeable impact on medical libraries in India — in preservation, access, efficiency, search, and user services

References

1. Kapoor, N. (2024). AI Horizons in Indian Healthcare: A Vision for the Future. Indian Association of Preventive and Social Medicine.
2. Sivasubramanian, S. (2025). Artificial Intelligence–augmented Public Health Systems in India.
3. Rahman, Z. (2024). Mapping Artificial Intelligence in Medical Diagnosis in India.
4. Press Information Bureau. (2025). India's Ayush Innovations Featured in WHO's Landmark Report.
5. World Health Organization (WHO), International Telecommunication Union (ITU), World Intellectual Property Organization (WIPO). (2025). AI Use in Traditional Medicine.
6. Economic Times. (2025). India Takes a Lead in the World by Digitizing Traditional Medicine Using an AI-Based Library.
7. India Today. (2025). Ayurveda Meets AI: India Becomes First Country to Digitize Traditional Medicine.
8. This feature highlights the launch of the Traditional Knowledge Digital Library (TKDL) and its impact on preserving traditional medical systems.
9. Economic Times. (2025). AI Healthcare India: India's AI Innovations in Traditional Medicine Recognized by WHO.An article discussing WHO's recognition of India's AI innovations in traditional medicine, emphasizing the global significance of these efforts.

10. Wolters Kluwer. (2025). Medical Library Discovery Service: How to Level Up with AI.

11. Knowewell. (2025). India's AI-Powered Traditional Medicine Library.