(MIJ) 2023, Vol. No. 9, Special Issue **e-ISSN: 2454-924X; p-ISSN: 2454-8103**

A Scenario of Pharmacy Education and Training in India[1]

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ABSTRACT

Pharmacy education in India focuses on producing skilled pharmacists who can contribute to the pharmaceutical industry, patient care, drug research, and public health initiatives. The profession of pharmacy plays a crucial role in the Indian healthcare system, and the emphasis on continuous learning and ethical practice ensures that pharmacists uphold high standards of patient safety and well-being. Some pharmacists may pursue postgraduate residency programsto gain advanced training and specialization in specific areas, such as ambulatory care,critical care, or infectious diseases.

INTRODUCTION

Pharmacy education and training involve the preparation of future pharmacists to provide pharmaceutical care and related services to patients. It is a comprehensive process that equips students with the knowledge, skills, and competencies needed to ensure the safe and effectiveuse of medications and promote optimal patient outcomes. In India, pharmacy education and training follow a structured and regulated system to produce competent pharmacists who can contribute to the healthcare system effectively. India's journey in pharmacy education has evolved over the years, transitioning from a focus on quality control and standardization to comprehensive programs emphasizing clinical pharmacy and patient care. The establishment of regulatory bodies, such as the PCI and AICTE, has played a crucial role in maintaining the quality of pharmacy education and practice in the country. As India continues to grow as a developing nation, pharmacy education remains vital in producing skilled pharmacists who contribute to healthcare, pharmaceutical research, and the well-being of the population.

After gaining independence in 1947, India faced the challenge of organizing and regulating the pharmacy profession, which was previously unorganized under British rule. There were no legal restrictions on the practice of pharmacy, and the concept of pharmacy practice was not fully recognized at that time. In 1948, the Pharmacy Act was enacted, serving as the country's first minimum standard of educational qualification for pharmacy practice and aiming to regulate the profession.

According to the Pharmacy Act, individuals interested in practicing as pharmacists need to have at least a diploma in pharmacy. The Act also established the Pharmacy Council of India (PCI) to implement its provisions and regulate pharmacy education and practice across the country. The Act mandated the creation of state pharmacy councils in each Indian state, responsible for controlling and registering pharmacists within their respective regions. These state pharmacy councils work in coordination with the PCI to ensure adherence to professional standards and ethics. Throughout the country, pharmacy institutions, which encompass both colleges/schools and universities, offer education and training in the English language. English serves as the sole language of instruction in these institutions, providing a uniform medium for delivering pharmacy education.

Since its enactment, the Pharmacy Act and the establishment of the PCI have played a pivotalrole in organizing and elevating the pharmacy profession in India. The Act has set minimum standards for pharmacy education and practice, ensuring that qualified and skilled pharmacists contribute effectively to the healthcare system and the pharmaceutical industry inthe nation.

[1] *How to cite the article:* Agrawal J. (2023), A Scenario of Pharmacy Education and Training in India, *Multidisciplinary International Journal*, Vol 9 (Special Issue), 80-87

Presented at 2nd International Conference on Research in Multidisciplinary Studies (ICRMS-2023)
Held on 06th August, 2023 through Google Meet

Table 1: Timeline of Pharmacy Education in India

Year	Milestone
1937	Introduction of a 3-year Bachelor of Pharmacy (BPharm) program at Banaras HinduUniversity, focusing on pharmaceutical chemistry, analytical chemistry, and pharmacy.
1944	Punjab University established a pharmacy department.
1947	L.M. College was established in Ahmedabad, offering a pharmacy degree program.
1951	Indian Pharmaceutical Congress was founded, providing a platform for pharmacists toexchange knowledge and discuss developments in the field.
1952	The Indian Pharmacy Act was enacted, regulating the practice of pharmacy in the country.
1955	The All India Council for Technical Education (AICTE) was established to oversee technicaleducation, including pharmacy programs.
1960s	The Pharmacy Council of India (PCI) was established to regulate pharmacy education andpractice in India.
1979	The PCI introduced the 4-year Bachelor of Pharmacy (BPharm) curriculum, focusing onclinical pharmacy and patient care.
1991	India implemented economic reforms, liberalizing its economy and opening opportunities forthe pharmaceutical industry.
1997	Introduction of the 5-year Doctor of Pharmacy (Pharm.D.) program in India, focusing onadvanced clinical pharmacy and patient care.
2014	India's pharmacy education system adopted the Choice Based Credit System (CBCS),providing students with flexibility in course selection and credit transfer.

EDUCATION STRUCTURE OF PHARMACY IN INDIA :

1. **Bachelor of Pharmacy (B.Pharm):**

- The Bachelor of Pharmacy (B.Pharm) is an undergraduate degree program in pharmacy. It typically spans four years and comprises both theoretical and practical coursework.

- B.Pharm curriculum includes subjects such as pharmaceutical chemistry, pharmacology, pharmaceutics, pharmacognosy, pharmaceutical analysis, and pharmaceutical engineering.

- During the course, students are exposed to practical training through laboratory work and industrial visits.

2. **Pharm.D. (Doctor of Pharmacy):**

- Pharm.D. is a professional doctoral degree program in pharmacy and is a recent addition to the Indian pharmacy education system.

- It is a six-year program that includes five years of academic coursework and one year of internship or practical training.

- Pharm.D. curriculum focuses on clinical pharmacy, patient care, and therapeutics, enabling graduates to become experts in medication management and pharmaceutical care.

3. **Licensure and Registration:**

- After completing B.Pharm or Pharm.D., graduates must register with the respective State Pharmacy Council to obtain a license to practice as a pharmacist.

- Licensure involves passing a qualifying examination conducted by the Pharmacy Council of India (PCI).

4. **Internship and Practical Training:**

- Students pursuing B.Pharm and Pharm.D. programs must complete a compulsory internship, often known as the "compulsory rotating internship" (CRI).

- The internship typically lasts for six months to one year, depending on the program, during which students gain hands-on experience in various pharmacy settings.

5. **Continuing Pharmacy Education (CPE):**

- After obtaining the license, pharmacists are encouraged to engage in Continuing Pharmacy Education (CPE) to keep themselves updated with advancements in pharmacy practice, new medications, and patient care guidelines.

- The PCI recommends a specified number of CPE credits for pharmacists to maintain their registration.

6. **Specialization and Postgraduate Studies**:

- After completing B.Pharm or Pharm.D., some pharmacists pursue postgraduate studies (M.Pharm or Pharm.D. Post Baccalaureate) to specialize in specific areas of pharmacy, such as pharmacology, pharmaceutics, hospital pharmacy, clinical pharmacy, etc.

7. **Pharmacy Council of India (PCI):**

- The Pharmacy Council of India (PCI) is the apex regulatory body that governs pharmacy education and practice in the country.

- PCI sets the standards for pharmacy education, conducts licensure examinations, and oversees the functioning of State Pharmacy Councils.

Table 2: PharmD and PharmD (post baccalaureate) Degree Curriculum Outline

Course Title	Hours of Study[b]		
	Theory	Practical[c]	Tutorial[d]
Year 1			
Human Anatomy and Physiology	99	99	33
Pharmaceutics	66	99	33
Medicinal Biochemistry	99	99	33
Pharmaceutical Organic Chemistry	99	99	33
Pharmaceutical Inorganic Chemistry	66	99	33
Remedial Mathematics/ Biology	99	99	33
Total hours = 1320			
Year 2			
Pathophysiology	99	-	33
Pharmaceutical Microbiology	99	99	33
Pharmacognosy and Phytopharmaceuticals	99	99	33
Pharmacology-I	99	-	33
Community Pharmacy	66	-	33
Pharmacotherapeutics-I	99	99	33
Total hours = 1056			
Year 3			
Pharmacology-II	99	99	33
Pharmaceutical Analysis	99	99	33
Pharmacotherapeutics-II	99	99	33
Pharmaceutical Jurisprudence	66	-	-
Medicinal Chemistry	99	99	33
Pharmaceutical Formulations	66	99	33
Total hours = 1188			
Year 4			
Pharmacotherapeutics-III	99	99	33
Hospital Pharmacy	66	99	33
Clinical Pharmacy	99	99	33
Biostatistics and Research Methodology	66	-	33
Biopharmaceutics and Pharmacokinetics	99	99	33
Clinical Toxicology	66	-	33
Total hours = 1089			
Year 5			
Clinical Research	99	-	33
Pharmacoepidemiology and Pharmacoeconomics	99	-	33
Clinical Pharmacokinetics and Pharmacotherapeutic Drug Monitoring	66	-	33
Clerkship	-	-	33
Project work (Six Months)[e]	-	660	-
Total hours = 1056			
Year 6			
Internship or Residency program			

GROWTH OF PHARMACY EDUCATION IN INDIA

The growth of pharmacy education in India has been remarkable over the years, transforming the profession into an organized and regulated field. Several factors have contributed to the expansion and development of pharmacy education in the country:

1. Establishment of Pharmacy Councils: The creation of the Pharmacy Council of India (PCI) and State Pharmacy Councils in the 1960s provided a regulatory framework to oversee pharmacy education and practice. These bodies set standards for curriculum, faculty, and infrastructure, ensuring quality education and ethical practice.
2. Introduction of New Programs: Over time, India introduced new educational programs in pharmacy, such as the Doctor of Pharmacy (Pharm.D.) and Pharm.D. Post Baccalaureate programs. These advanced programs emphasize clinical pharmacyand patient care, equipping pharmacists to play a more significant role in healthcare.

3. Accreditation and Affiliation: Pharmacy institutions seek accreditation from professional bodies and affiliations with reputed universities, which enhance their credibility and attract more students. Accredited programs ensure adherence to qualitystandards and foster continuous improvement.
4. Research and Innovation: Increased emphasis on research in pharmacy has led to the establishment of specialized research centers and facilities. Universities and institutions are promoting research in pharmaceutical sciences and encouraging students and faculty to engage in innovative projects.
5. Collaboration with Industry: Partnerships between academia and the pharmaceutical industry have led to collaborative research, internships, and industry-academic interactions. Such collaborations ensure that pharmacy education aligns with industry needs and current trends.
6. Technological Advancements: Integration of technology in pharmacy education has enhanced teaching and learning experiences. E-learning platforms, virtual laboratories, and simulation tools offer practical training and foster digital literacy.
7. Global Exposure: International collaborations and exchange programs provide opportunities for students and faculty to gain exposure to global practices and advancements in pharmacy. This exposure enhances cross-cultural learning and opensavenues for international research collaborations.
8. Demand for Healthcare Services: The increasing demand for healthcare services has driven the need for well-trained pharmacists. As healthcare systems expand, there is a greater demand for pharmacists to contribute to patient care and medication management.
9. Policy and Government Initiatives: Government initiatives and policies aimed atimproving healthcare and pharmaceutical services have contributed to the growth of pharmacy education. Schemes to upgrade infrastructure and provide scholarships haveincreased accessibility to education.
10. Recognition and Career Opportunities: Pharmacists are gaining recognition for their vital role in healthcare. The growing awareness of the profession has attracted more students to pursue pharmacy education, leading to an increase in the number ofpharmacy institutions.

EDUCATIONAL PROGRAMS IN PHARMACY

Educational programs in pharmacy are designed to equip students with the necessary knowledge, skills, and competencies to practice as pharmacists or pursue careers in the pharmaceutical industry, research, or academia. These programs vary in duration, content, and level of qualification offered. Here are the main types of educational programs inpharmacy:

1. Bachelor of Pharmacy (B.Pharm):

- The Bachelor of Pharmacy (B.Pharm) is an undergraduate degree program that typically spans four years.
- B.Pharm programs focus on fundamental pharmaceutical sciences, such as pharmaceuticalchemistry, pharmacology, pharmaceutics, pharmacognosy, and pharmaceutical analysis.
- Students learn about drug development, drug formulation, drug interactions, and theprinciples of pharmaceutical care.

2. Doctor of Pharmacy (Pharm.D.):

- Pharm.D. is a professional doctoral degree program that typically spans six years, includinga mandatory one-year internship.
- The Pharm.D. curriculum emphasizes clinical pharmacy, patient care, and evidence-basedpractice.
- Students are trained to play an active role in medication management, providing drugtherapy recommendations, patient counseling, and monitoring.

3. Master of Pharmacy (M.Pharm):

- The Master of Pharmacy (M.Pharm) is a postgraduate degree program that typically spanstwo years.
- M.Pharm programs offer specialized training in specific areas of pharmacy, such aspharmacology, pharmaceutics, pharmaceutical analysis, or clinical pharmacy.

- Students engage in research and advanced coursework in their chosen area of specialization.

4. **Pharm.D. Post Baccalaureate (Pharm.D. PB):**

- Pharm.D. Post Baccalaureate is a three-year program designed for graduates holding aB.Pharm degree.

- It provides additional clinical training and exposure to patient care, similar to the Pharm.D.program.

5. **Ph.D. in Pharmacy:**

- Ph.D. programs in pharmacy are research-based doctoral programs that focus on producingindependent researchers and scholars in pharmaceutical sciences.

- Ph.D. candidates conduct original research under the guidance of faculty mentors andcontribute to the advancement of pharmaceutical knowledge.

6. **Diploma in Pharmacy (D.Pharm):**

- The Diploma in Pharmacy (D.Pharm) is a diploma-level program that typically spans twoyears.

- D.Pharm programs provide basic education in pharmaceutical sciences and prepare studentsto work as pharmacy technicians or assistants under the supervision of licensed pharmacists.

7. **Continuing Pharmacy Education (CPE):**

- Continuing Pharmacy Education (CPE) refers to ongoing professional development and learning opportunities for licensed pharmacists.

- CPE programs help pharmacists stay updated with advancements in pharmacy practice, newmedications, and patient care guidelines.

Pharmacy educational programs are regulated by national and regional bodies, such as the Pharmacy Council of India (PCI), ensuring the quality and standardization of pharmacy education in the country. These programs play a crucial role in preparing pharmacists withthe necessary knowledge and skills to provide safe and effective pharmaceutical care to patients and contribute to advancements in the field of pharmacy.

REGULATIONS AND QUALITY ISSUES IN PHARMACY IN INDIA

Regulations and quality issues in pharmacy in India are governed by various bodies and statutes to ensure the safe and effective practice of pharmacy and maintain high standards of education, training, and ethical conduct. The key regulatory authorities and quality issues in pharmacy in India are as follows:

1. **Pharmacy Council of India (PCI):**

- The Pharmacy Council of India (PCI) is the apex regulatory body that governs pharmacy education and practice in the country.

- PCI is responsible for setting and regulating the standards of pharmacy education, approving pharmacy institutions, and granting recognition to pharmacy programs.

- It also registers pharmacists and pharmacy technicians, enforces the Pharmacy Act, and promotes continuing pharmacy education.

2. **State Pharmacy Councils:**

- Each state in India has its own State Pharmacy Council, which operates under the guidelinesof the PCI.

- State Pharmacy Councils are responsible for registering and regulating pharmacists within their respective states, ensuring compliance with the Pharmacy Act and related regulations.

3. Pharmacy Act and Regulations:

- The Pharmacy Act, 1948, is the primary legislation governing the profession of pharmacy inIndia. It outlines the qualifications required for pharmacy practice, registration ofpharmacists, and the establishment of pharmacy councils.

- PCI issues various regulations, including the Education Regulations, which set standards forpharmacy education, and the Code of Ethics, which lays down ethical guidelines for pharmacists.

4. Accreditation and Quality Assurance:

- Pharmacy institutions in India seek accreditation from the National Board of Accreditation (NBA) and the National Assessment and Accreditation Council (NAAC).

- Accreditation ensures that institutions meet prescribed quality standards in infrastructure, faculty, curriculum, and research.

5. Quality Control of Medicines:

- The Central Drugs Standard Control Organization (CDSCO) is responsible for regulating pharmaceuticals and medical devices in India.

- CDSCO ensures the quality, safety, and efficacy of drugs through drug registration, licensing, and inspection of manufacturing facilities.

6. Good Manufacturing Practices (GMP):

- India follows Good Manufacturing Practices (GMP) to ensure the quality and safety of pharmaceutical products.

- GMP guidelines provide standards for the manufacturing, testing, and quality control of pharmaceuticals.

7. Pharmacovigilance:

- Pharmacovigilance is the process of monitoring and reporting adverse drug reactions and medication errors.

- The National Pharmacovigilance Program for Drugs and Biologicals (PvPI) is responsible for monitoring and ensuring the safe use of medicines.

8. Counterfeit Drugs:

- India has taken steps to combat counterfeit drugs through various measures, including increased regulation, tracking and tracing systems, and public awareness campaigns.

Ensuring adherence to regulations and quality standards in pharmacy is crucial to safeguarding public health and maintaining the integrity of the profession. Effective regulation and quality control help in promoting patient safety, preventing substandard or counterfeit drugs, and fostering trust in the healthcare system. Regular updates to regulations and continuous monitoring are essential to address emerging challenges and ensure a robust and reliable pharmaceutical system in India.

CONCLUSION

Pharmacy education and training are dynamic and evolving fields, adapting to changes in healthcare delivery, technology, and patient needs. The aim is to produce competent and compassionate pharmacists who play a vital role in the healthcare team and ensure the safe and effective use of medications for the benefit of patients. The growth of pharmacy

education in India reflects the increasing importance of the pharmacy profession in thehealthcare ecosystem. The focus on quality education, research, innovation, and industry collaboration ensures that pharmacy graduates are well-prepared to address the evolving healthcare needs of the country and contribute to the advancement of pharmaceutical sciences.

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