



## Glimpse of Pharmaceutical Education in India: History to Advances

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### Review Article

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### Abstract

The pharmaceutical education portrays a composite combination of the history, evolution and advances of the whole gamut of pharmacy instructions and related aspects in India. The treatise dilates upon the historical perspectives, practice of pharmacy education in this country. Profiles of older information were chronicled as far as possible. A careful research has gone into digging out the appropriate evidences in support of the writings on different aspects of the pharmaceutical education in India. This unique survey presented in this paper may be progress for pharmacy history and evolution amongst pharmaceutical history researchers pharmacy academicians as well as science historian.

**Keywords:** *Glimpse, Pharmaceutical, Education, India, History, Advances.*

#### Historical Perspective: At a glance

- Lord brahma was the first teacher of universe who wrote "Ayurveda" (Science of life) in 5000 BC. Lord dhanwantris eas worshipped as "God of Health" holding the amrut (nectar) in his hand. Righveda described the various herbs used in treating numerous diseases. Charaka and sushrata spread the message of Ayurveda in ancient India. In BC 226-Hospital concept in the period of Great Ashoka was well developed and practiced in India. In 900 AD- Tamilnadu (Tirumakku dal village) discovered organized hospital activity in India treating diseases like piles, jaundice, dropsy, TB, hemorrhage, etc. In 1000 AD- All the medical works were medaled on the Charaka pattern of treatment of diseases Europe was influenced by

- Indian drugs and herbs in 1500 century. Portuguese physician cum teacher Garcia d aorta published a treatise: "Cologuious dos stroples a drogus da indica" describing various Indian herbs in 1563. The history of pharmacy profession or practice in India starts with opening of chemist shop in 1811 by Scotch M Bathgate opened in Kolkata. This was probably the beginning of pharmacy practice in India [1].

- In 1860, (December), the pharmacy class was started at Madras Medical College. In 1886, the duration of the study was made two years and for entry, qualification of having passed the middle school examination was required. In 1894, the Pharmaceutical Journal and Transactions noted, The certificate of a Chemist & Druggist is given in Madras to the students who attends full courses of instruction in material medica, chemistry, practical chemistry & practical pharmacy in the medical college.

- E.J Wang tabled the motion for publication of Indian Pharmacopoeia- 4th march 1864. H.W. Honey, the "first qualified person" to get recognition as chemist and druggist in India in 1866. "First Pharmacopoeia of India" under British Monarchy in India was published in 1868.

- Starting of regular two years course for "Chemists and Druggists Diploma" at MMC, Chennai in 1874.

- November 1920- The first organized move to form a pharmaceutical society, the Calcutta Chemists & Druggists Association released third, which changed its name to Bengal Chemists & Druggists Association in 1926.

- First issue of Indian journal of Pharmacy was released in 1939- Official publication of IPA.

- In 1881, in Bengal a statutory provision was made for education and examination of compounders. School of Chemical Technology at Calcutta was opened in 1919 which gave short courses in pharmaceutical chemistry and drug



manufacture and indigenous drugs (by research), soap & oil, food and technologies etc. In 1920, Calcutta University introduced M.Sc in Applied Chemistry, with pharmaceuticals as a specialization from 1940.

- Subhadra Kumar Patni became the first Pharmacy Graduate in India in 1940 – Formation of Pharmacy and Allied Manufacturers & Distributors Association Ltd. (PAMDAL) – head quartered at Mumbai.
- Gorakh Prasad Srivastava became the first Post Graduate in Pharmacy from BHU in 1943.
- 1945: Govt. brought the Pharmacy Bill to standardize the Pharmacy Education in India.
- Indian Pharmaceutical Congress Association (IPCA) was floated in 1948 at Calcutta and the first annual conference was held in Calcutta itself in December 1948 with Prof. M.L. Shroff as a president Elec. But this address was read in absentia which a surprise was for everybody.
- Pharmaceutical Society of India was started in the year 1923 under the name of “The Pharmaceutical Association”. In 1925, the name was changed into “The Pharmaceutical Society of India”. The society members started appending with their names the qualification M.P.S (India). It's the oldest organization and in 1949, The Pharmaceutical Society of India stood amalgamated with the Madras Branch of the Indian Pharmaceutical Association.
- First Diploma in Pharmacy education institute started at Jalpaiguri, 1949 at West Bengal. Education Regulation of PCI laid down Diploma of Pharmacy (D.Pharm) as the minimum qualification to enter into the profession of pharmacy in India-1953. Sheovihari Lal became the first PhD holder in Pharmacy field, obtaining his Doctorate degree from University of Patna (Patna Medical College) under the guidance of Dr Achari, Department of Pharmacology, 1953.
- Prof M.L. Schroff- “The Father of Pharmacy in India” and was elected the PCI President on 15<sup>th</sup> November, 1954.
- Prof (Dr). Manjushree Pal was the first Indian lady pharmacist from Calcutta.
- Mr. S.N. Bal happens to be the first foreign qualified pharmacist (1913) in India along with Mr. Premananda Das.
- Pandit Madan Mohan Malaviya who inaugurate pharmaceutical education at the Benaras Hindu University, UP (1932). In 1932, Pharmaceutical Chemistry was introduced as one of the subject for B. Sc. Degree in Banaras Hindu University, UP. In 1934, an integrated two years course of studies leading to B.Sc. (Pharmaceutics) was started in Banaras Hindu University, UP. This is the first Indian University to start 3 years B. Pharm course in the year of 1937. The first batch graduating in 1940. The course studies included Pharmacy,

Pharmaceutical chemistry, Pharmacognosy, German & pharmaceutical economics. But, the Human physiology & Pharmacology were not included. In April 1940, the BHU started M. Pharm research degree.

- Dr. Khem Singh Grewal, founder of pharmaceutical education at the Panjab University, Panjab. It becoming second institution in India and started B.Pharm course from 1944.
- Dr. Ratibhai Prabhudas Patel, Principle of the Lallubhai Motilal College of Pharmacy, Ahmedabad which started 2.5 years B.Pharm degree of the University of Bombay with an intake of 60 students each year in June, 1947. This college was affiliated with Gujarat University in 1950.
- In September 1938, The University of Madras started 2 years degree course leading to B.Sc Pharmacy. The Madras Medical College was recognized in May 1939 for conducting the degree course. The classes started on 3<sup>rd</sup> July 1939 with 10 students. In 1946, Madras Medical College was got a separate department of Pharmaceutics which entrusted with the teaching of Pharmaceutics, Pharmaceutical Chemistry and Pharmacognosy. From 1950, the university started 3 years Bachelor of Pharmacy Course. The prominent teacher was Professor Arayapuram Natesa Ratnagiriswaran.
- The Department of Pharmacy, Birla Institute of Technology and Science, Pilani also a creation of Prof. M.L. Schroff & Professor Paramjit Rai Pabrai was selected to HOD in July 1950.
- Madras Medical College has provision for M.Sc degree in Pharmacy which included a regular course work and submission of thesis.
- The one year M.Pharm course was introduced Andhra University in 1954 with two special subjects, namely, analysis of foods, drugs and water (branch I) and manufacture of pharmaceuticals and fine chemicals (branch II). From 1969, the university offered two years M.Pharm in pharmaceutical and food analysis, pharmaceutical and fermentation technology (recent the name is Pharmaceutical Biotechnology), pharmaceutical chemistry.
- In 1970, the college of pharmacy at Manipal started M.Pharm in Pharmacy Administration.
- In 1979, the college of pharmacy at New Delhi offered M.Pharm in Pharmaceutics and Pharmacology & from 1982 M.Pharm in Hospital Pharmacy.



- The Hamdard College of Pharmacy (Affiliated with Delhi University) in 1982 introduced M .Pharm (Pharmacognosy and Phytochemistry).
- In 1983, Kakatiya University introduced M.Pharm in Drug formulation and Technology (Pharmaceutics)
- In 1966, Department of Pharmacy of the Jadavpur University started 2 years M.Pharm in Pharmaceutics, Pharmacology, Pharmaceutical chemistry, Biochemistry, Pharmaceutical Microbiology, Pharmacognosy and Pharmaceutical Engineering.
- The pharmacy studies at the Andhra University, Waltair was started in the year 1937. The students graduating with honours in chemical technology had a special subject of study on pharmaceuticals and fine chemicals. The 3 years B.Pharm was started in 1951 & Department of Pharmacy was created in 1952. Professor Srinivasa Rangaswami was appointed the head.
- Professor A.K. Bhattacharya , founder of pharmaceutical education in Doctor Harisingh Gour Vishwavidyalaya , The short B.Pharm course was started in 1954 & new B.Pharm was introduced in July 1956. In July 1948, introduction of a diploma in soaps and cosmetics was started. In July 1952, the B.Sc course was designated with Chemistry, Pharmaceutical Chemistry, and Industrial Chemistry (Singh, 2011).
- The Department of Pharmacy, Nagpur University appeared on the scene in July 1956 & Dr. A.S. Paranjpe became HOD in November 1957.
- Dr. Homi R. Nanji, Head, Pharmaceuticals and Fine Chemicals Section, University Department of Chemical Technology, University of Bombay was commenced the B.Sc (Tech) in Pharmaceuticals and Fine Chemicals in 1943. The 3 years B.Pharm course was introduced in June 1958 which was upgraded in 1984-85 (four years B.Pharm) .Since 1988, the degree course course was renamed as the Bachelor of Pharmaceutical Sciences (B.Pharm.Sci).
- In Jadavpur University, Calcutta the B.Pharm course started in September 1963. In July, 1964, Prof M.L.Schroff appointed as Professor and HOD. Earlier Professor Bijan Kumar Gupta joined as a reader. The department was renamed as the Pharmaceutical Technology in 1988 which come under the previews of the Faculty of Engineering and Technology.

#### Pharmaceutical Programs

Recently, the D.Pharm or B.Pharm(Kulkarni,2009) intake capacity is 60 or 120 per year as per PCI & AICTE norms. The animal house, library, pharmacy museum, auditorium / multipurpose hall, seminar hall, herbal garden are required for both D.Pharm & B.Pharm courses in the final year for any Indian Pharmacy Institutions. The laboratory requirements for B.Pharm are 03 Pharmaceutics laboratory, 02 Pharmaceutical Chemistry Laboratory, 01 Pharmaceutical Analysis laboratory,

02 Pharmacology laboratory, 01 Pharmacognosy laboratory, 01 Pharmaceutical Biochemistry laboratory & for D.Pharm are 01 Pharmaceuticals laboratory, 01 Pharmaceutical Chemistry laboratory, 01 Physiology and Pharmacology laboratory, 01 Pharmacy Practice laboratory, 01 Pharmacognosy laboratory and for both courses 01 computer room, 01 machine room, 01 central instrumentation room, 05 preparation room, 01 store room (I), 01 store room (II) for inflammable chemicals are required. For 2 years D.Pharm 01 Principal /HOD & 07 Lecturer/Sr. Lecturers are required & for 4 years B.Pharm part time faculty members are required for Mathematics, Biology, Technical English, Computer Science, Engineering Drawing subjects and full time /permanent faculty members are required for Pharmaceutical Chemistry, (Professor :01, Assistant Professor :03, Lecturer:03) , Pharmaceutical Analysis (Professor :01, Lecturer:01) , Pharmacology (Professor :01, Assistant Professor :02, Lecturer:01), Pharmacognosy (Professor :01, Assistant Professor :01, Lecturer:02), Pharmaceutics (Professor :01, Assistant Professor :02, Lecturer:03) , Pharmacy Practice (Assistant Professor :01, Lecturer:01) , Principal any branch in pharmacy. The regulations framed under section 10 of the Pharmacy Act, 1948(8 of 1948) which is approved by the Government of India, Ministry of Health and notified by the Pharmacy Council of India. In exercise of the powers conferred of section 10 of the Pharmacy Act, 1948 (8 of 1948), the pharmacy council of India, with the approval of the central government hereby makes some regulations such as <sup>[2]</sup>.

- Under the regulations, which institutions running B.Pharm approved under section 12 of the pharmacy Act, will only be permitted to run Pharm.D Pharm.D (P.B) program will be permitted only in those institutions which are permitted to run Pharm.D <sup>[3]</sup>.

- The first year courses include the subjects (theory and practical): Human Anatomy and Physiology, Pharmaceutics, Medicinal Biochemistry, Pharmaceutical Organic Chemistry, Pharmaceutical Inorganic Chemistry, Remedial Mathematics and Biology.

- The second year theory courses are Pathophysiology, Pharmacology –I and Community Pharmacy and courses include the subjects (theory and practical): Pharmaceutical Microbiology, Pharmacognosy and Pytopharmaceuticals, Pharmacotherapeutics-I.

- The third year theory course is Pharmaceutical Jurisprudence and courses include the subjects (theory and practical): Pharrmacology-II, Pharmaceutical Analysis, Pharmacotherapeutics- II, Medicinal Chemistry, and Pharmaceutical Formulations.



- The fourth year theory courses are Biostatistics and Research Methodology and Clinical Toxicology and courses include the subjects (theory and practical): Pharmacotherapeutics- III, Hospital Pharmacy, Clinical Pharmacy, Biopharmaceutics and Pharmacokinetics.

- The fifth year theory courses are Clinical Research, Pharmacoepidemiology and Pharmacoeconomics, Clinical Pharmacokinetics & Pharmacotherapeutic Drug Monitoring. The clerkship also include the course which the students attending ward rounds on daily basis.

- The sixth year consists of internship in minimum 500 bedded hospital or residency training including postings in specialty units. Students should independently provide the clinical pharmacy services to the allotted wards.

- i. Six months in general medicine departments.
- ii. Two months each in three other specialty departments (Surgery, Pediatrics, Gynecology and Obstetrics, Psychiatry, Skin and VD, Orthopedics).

- Examination: The examination shall be of written and practical (including oral nature). Each examination may be held twice every year. The first examination in a year shall be the annual examination and the second examination shall be supplementary examination<sup>[4]</sup>.

- As per regulations; Professor, Assistant Professor, Lecturer posts are required under five departments, The departments are Pharmaceutics (Professor: 01, Asst. Professor: 01, Lecturer: 02); Pharmaceutical Chemistry including Pharmaceutical Analysis (Professor: 01, Asst. Professor: 01, Lecturer: 03); Pharmacology (Professor: 01, Asst. Professor: 01, Lecturer: 02) Pharmacognosy (Professor: 01, Asst. Professor: 01, Lecturer: 01) Pharmacy Practice (Professor: 01, Asst. Professor: 02, Lecturer: 03). The workload of faculty: Professor (8 hours per week), Assistant Professor (12 hours per week), Lecturer (16 hours per week). All faculties shall be full time. However, Part time preceptors in hospital shall be allowed.<sup>[5]</sup>.

### **Ontological Cluster in Indian Pharmaceutical Courses with Institutes / Departments / Universities Examples<sup>[6]</sup>**

#### **1. Certificate Courses:**

- (a) Certificate course in Community Pharmacy (3 months) e.g. KLE Academy of Higher Education and Research, Belgium, Karnataka, India.
- (b) Certificate course in Homeopathic Pharmacy (1 Year) e.g. Institute of Homeopathic Pharmacy, Coochbehar, West Bengal (Council of Homeopathic Medicine, West Bengal).
- (c) Certificate course in Ayurvedic Pharmacy, 10<sup>th</sup> (1 Year) e.g. CMJ University, Meghalaya.
- (d) Certificate in Pharmacy Assistant, 10<sup>th</sup> (1 Year) e.g. CMJ University, Meghalaya.

#### **2. Diploma Courses:**

- (a) Diploma in Ayurved Nursing and Pharmacy (3 years) e.g.

Rajasthan Ayurved University, Jodhpur.

- (b) Diploma in Pharmacy (2 Years) e.g. Institute of Pharmacy, Jalpaiguri, West Bengal

- (c) Diploma in Veterinary Pharmacy (2 Years) e.g. Institute of Animal Health and Veterinary Biologicals, Kolkata.

- (d) Diploma in Ayurvedic Pharmacy (3 Years) e.g. Lovely in Professional University, Punjab.

- (e) Diploma in Pharmaceutical Management (3 Years) e.g. Allahabad Agricultural Institute (Deemed University), Uttar Pradesh

- (f) Diploma in Unani Pharmacy (2 Years) e.g. Jamia Hamdard (Hamdard University), New Delhi.

- (g) Diploma in Homoeopathic Pharmacy, 10+2 or its equivalent (4 Years) e.g. CMJ University, Meghalaya.

- (h) Diploma in Ayurvedic Pharmacy, 10+2 or its equivalent (2 Years) e.g. CMJ University, Meghalaya.

#### **3. Bachelor of Pharmacy Courses:**

- (a) Bachelor of Pharmacy (4 Years) e.g. School of Pharmacy, Chouksey Engineering College, C.G.

- (b) Bachelor of Pharmacy-Ayurveda (4 Years) e.g. Lovely Professional University, Punjab.

- (c) Integrated D. Pharm (Ayur)-B. Pharm (Ayur) 6 Years e.g. Lovely Professional University, Punjab.

- (d) Bachelor of Pharmacy-Unani (4 Years) e.g. Jamia Hamdard (Deemed University, New Delhi).

- (e) B.Sc in Homoeopathic Pharmacy, 10+2 with Biology (4 Years) e.g. CMJ University, Meghalaya.

#### **4. Master of Science Courses:**

- (a) Integrated B.Sc. and M. Sc. In Pharmaceutical Sciences (5 Years) e.g. Apeejay Stya University.

- (b) M.Sc. in Pharmaceutical Sciences (2 Years) e.g. Apeejay Stya University.

- (c) M.Sc. in Pharmacology, Pharmaceutical Chemistry (2 Years) e.g. Lovely Professional University, Punjab.

- (d) M.Sc. in Pharmacology (3 Years) e.g. University of Madras.

- (e) M.Sc. in Advanced Pharmaceutical Sciences; Medical Pharmacology (2 Years) e.g. Manipal University, Karnataka.

- (f) Integrated M.Sc. in Herbal Sciences (1 Year) e.g. Annamalai University, Tamil Nadu.

- (g) M.Sc. in Pharmaceutical Regulatory Affairs; Nanopharmaceuticals, Neutraceuticals and Cosmeceutical Sciences (2 Years) e.g. Manipal University.

- (h) M.S. in Forensic Pharmacy (2 Years) e.g. Gujrat Forensic Sciences University, Gandhinagar, Gujrat.

#### **5. Lateral Entry Courses:**

- (a) Lateral Entry B. Pharm. And B. Pharm (Ayur) [3 Years] e.g. Lovely Professional University, Punjab.

- (b) Lateral Entry B. Pharm (Unani) [3 Years] e.g. Jamia Hamdard (Deemed University), New Delhi.



#### **6. Post Graduate Certificate (PGC) Courses:**

- (a) PGC in Management (Pharmaceutical Marketing) [1 Year] e.g. All India Management Association, New Delhi.
- (b) PGC in Biological Techniques; Pharmaceutical Biotechnology (1 Year) e.g. Birla Institute of Technology (Deemed University), Jharkhand.

#### **7. Post Graduate Diploma (PGD) Courses:**

- (a) PGD in Pharmaceutical Biotechnology (1 Year) e.g. Dr. B. Lal Institute of Biotechnology, Jaipur, Rajasthan.
- (b) PGD in Pharmaceutical Quality Assurance and Quality Control (1 Year) e.g. Bioinformatics Institute of India.
- (c) PGD in Pharmaceutical Management (1 Year) e.g. KC College of Management Studies, Mumbai, Maharashtra.
- (d) PGD in Pharmaceutical Business Management (Advanced Diploma) (1 Year) e.g. MET Institute of Medical Sciences, Mumbai.
- (e) PGD in Pharmaceutical Marketing (1 Year) e.g. Pondicherry University.
- (f) PGD in Herbology (1 Year) e.g. Jadavpur University
- (g) PGD in Clinical Research (1 Year) e.g. Bombay College of Pharmacy, Mumbai.
- (h) PGD in Medical Cosmetology; Medical Law and Ethics; Clinical Research; Medical Transcription; Pharmacy Practice and Drug Store Management; Promoting Rational Drug Use (1 Year) e.g. Annamalai University, Tamil Nadu.

#### **8. Master of Technology (M. Tech) Courses:**

- (a) M.Tech in Pharmaceutical Chemistry (2 Years) e.g. Vellore Institute of Technology (Deemed University).
- (b) M. Tech in Pharmaceutical Technology and Fine Chemicals; Pharmacology (2 Years) e.g. University of Calcutta, Kolkata, West Bengal<sup>[7]</sup>.

#### **9. Master of Technology (Pharm) Courses:**

- (a) M. Tech (Pharm) in Pharmaceutical Technology (Bulk Drugs); Biotechnology (2 Years) e.g. National Institute of Pharmaceutical Education and Research (NIPER), Punjab.

#### **10. Master of Business Administration Courses:**

- (a) MBA (Pharm) in Pharmaceutical Management (2 Years) e.g. NIPER, Punjab.
- (b) MBA in Pharmaceutical Technology Management; Pharmaceutical Sales Management (2 Years) e.g. Vidyasagar University, West Bengal.
- (c) MBA in Pharmaceutical management (2 Years) e.g. Prist University.
- (d) Executive MBA in Pharmaceutical Management (1 Year) e.g. Prist University.

#### **11. Master of Science (Pharm) Courses:**

- (a) M. S. (Pharm) in Traditional Medicine; Medicinal Chemistry; Natural Products; Pharmaceutical Analysis; Pharmacology and Toxicology, Pharmaceutical Biotechnology; Pharmacoinformatics, Regulatory Toxicology (2 Years) e.g. NIPER, Punjab.

#### **12. Integrated B. Pharm.-M. Pharm Course (6 Years)**

e.g. Lovely Professional University, Punjab.

#### **13. Integrated B. Pharm.-MBA Course (5 Years) e.g.**

Lovely Professional University, Punjab.

#### **14. Master of Pharmacy In (2 Years):**

- (a) Pharmaceutical Technology; Pharmacy Practice. E.g. NIPER, Punjab.
- (b) Pharmaceutics; Pharmaceutical Biochemistry; Pharmaceutical Microbiology; Pharmacology; Pharmacognosy; Pharmaceutical Engineering; Clinical Pharmacy and Pharmacy Practice. e.g. Jadavpur University, Kolkata.
- (c) Drug Regulatory Affairs. e.g. Gupta College of Technological Sciences, Asansol.
- (d) Pharmaceutical Marketing and Management; Pharmacy Practice; Pharmaceutical Chemistry. E.g. Al-Ameen College of Pharmacy, Bangalore, Karnataka.
- (e) Pharmaceutical Marketing; Pharmaceutical Quality Assurance; Pharmaceutical Administration. e.g. Manipal University
- (f) Bulk Drugs; Phytopharmacy and Phytomedicine e.g. J.S.S. College of Pharmacy, Mysore/Ooty.
- (g) Pharmaceutical Analysis. E.g. KM Kundnani College of Pharmacy, Mumbai.
- (h) Quality Assurance. e.g. Bharati Vidyapeeth's College of Pharmacy, Maharashtra.
- (i) Pharmaceutical Biotechnology; Pharmaceutical Analysis and Quality Assurance. e.g. Kanak Manjari Institute of Pharmaceutical Sciences, Rourkela.
- (j) Pharmaceutical and Food Analysis. E.g. Andhra University, A.P.
- (k) Clinical Pharmacy. E.g. SVKM'S NMIMS University, Mumbai.
- (l) Hospital and Clinical Pharmacy. e.g. Royal College of Pharmacy and Health Sciences, Berhampur, Orissa.
- (m) Industrial Pharmacy. e.g. Annamalai University, T.N.
- (n) Biopharmaceutics and Biopharmaceutics. E.g. Karad College of Pharmacy
- (o) Pharmaceutical Technology and Biopharmaceutics; Medicinal Chemistry; Phytopharmaceuticals and Natural Products; Drug Discovery. e.g. NIRMA University, Gujrat.
- (p) Pharmacognosy and Phytochemistry. e.g. Lovely Professional University, Punjab.

**15. Master of Pharmacy Course (2 Years).** e.g. Birla Institute of Technology and Sciences, Pilani.

**16. Master of Pharmacy (Ayurveda) Course (2 Years).** e.g. Lovely Professional University, Punjab.

**17. B. Pharm (Ayur)-M. Pharm (Ayur) Integrated course (6 Years).** e.g. Lovely Professional University,



Punjab.

**18. Master of Pharmacy (Ayurveda) Courses (2 Years) In:** Ayurvedic Pharmaceutics (Rasa Shashtra); Ayurvedic Plant Sciences (Dravyaguna); Pharmaceutical Analysis and Standardization of Ayurvedic Drugs; Pharmacology and Toxicology of Ayurvedic Drugs; Pharmacognosy and Phytochemistry of Ayurvedic Drugs. E.g. Gujrat Ayurved University, Gujrat.

**19. Master of Philosophy Courses:**

(a) M. Phil. in Pharmacy (1 Year). E.g. NIMS University, Rajasthan; CMJ University, Meghalaya.

(b) M. Phil. in Cosmetology; Medicinal Plants (1 Year). E.g. CMJ University, Meghalaya.

**20. Doctor of Philosophy Courses:**

(a) Ph.D. in Pharmacy (2 to 5 Years). e.g. Jadavpur University, Kolkata; CMJ University, Meghalaya.

(b) Ph.D. in Ayurvedic Pharmacy (2 to 5 Years). e.g. Jadavpur University, Kolkata.

(c) Ph.D. in Ayurvedic Pharmacy (3 Years approx.). e.g. Lovely Professional University, Punjab.

(d) Ph.D. in Pharmaceutics and Pharmaceutical Technology; Pharmacology; Pharmaceutical Analysis; Pharmaceutical Chemistry; Pharmacognosy (3 Years approx). e.g. NIRMA University.

(e) Ph.D. in Pharmaceutics; Pharmacognosy and Phytochemistry; Pharmaceutical Medicine etc. (3 Years approx). e.g. Jamia Hamdard (DU), New Delhi.

(f) Ph.D. in Pharmacy Practice; Quality Assurance; Pharmaceutical Marketing and Management etc. (3 Years approx). e.g. Al-Ameen College of Pharmacy, Bangalore.

In India, other specific Ph.D. is also available instead of above courses.

**21. Doctor of Pharmacy Courses:**

(a) Doctor of Pharmacy (Pharm. D)-(6 Years) Course. E.g. Annamalai University, Tamil Nadu.

(b) Doctor of Pharmacy (Pharm. D-Post Baccalaureate)-(3 Years) Course. E.g. Annamalai University, Tamil Nadu.

**22. D. Sc. Courses:**

Post Doc/D.Sc. in Pharmacy Course. E.g. Dr. H. S. Gour Vishyavidyalaya (University), Sagar, M.P, National Institute of Pharmaceutical Education and Research (NIPER), India.

**National Institute of Pharmaceutical Education and Research**

The National Institute of Pharmaceutical Education and Research, India was established by the Government of India to cater to the long-standing demand for setting up a dedicated nodal for quality higher education and advanced research in the pharmaceutical sciences. Colonial rule in an era of rapid advancement of sciences and technology had left the once a land of pioneers in sciences a few decades behind the frontline researchers. The main objective of NIPER is to provide

leadership in pharmaceutical science with industry, national and international collaborations and promoting community and institutional pharmacy apart from establishing national centres in advanced research and emerging areas.

NIPER offers Master's and Doctoral programs in various fields of the pharmaceutical sciences.

The course duration of Masters programs is four semesters, while the doctoral programs typically take six to ten semesters depending on the subject area of research. A scholar has to take a minimum number of credits offered from various departments depending on the program and branch of study. The Research, its presentation, and defense carry their own credits reflected in the final Cumulative Grade Point Average (CGPA).

**Table 01: Masters Courses offered at various institutes**

Location	Masters courses	Ph.D. courses
Ahmedabad	<ul style="list-style-type: none"> <li>• Pharmaceutics</li> <li>• Pharmaceutical Analysis</li> <li>• Pharmacology and Toxicology</li> <li>• Medicinal Chemistry</li> <li>• Biotechnology</li> <li>• Natural Products</li> </ul>	<ul style="list-style-type: none"> <li>• Pharmaceutics</li> <li>• Natural Products</li> <li>• Biotechnology</li> </ul>
Hajipur	<ul style="list-style-type: none"> <li>• Pharmacy practice</li> <li>• Pharmacoinformatics</li> <li>• Biotechnology</li> </ul>	<ul style="list-style-type: none"> <li>• Pharmacoinformatics</li> <li>• Biotechnology</li> </ul>
Mohali (S.A.S. Nagar)	<ul style="list-style-type: none"> <li>• Pharmaceutics</li> <li>• Pharmaceutical Technology (Formulations)</li> <li>• Pharmacology and Toxicology</li> <li>• Medicinal Chemistry</li> <li>• Pharmaceutical Technology (Bulk Drugs)</li> <li>• Natural Products</li> <li>• Pharmaceutical Analysis</li> <li>• Biotechnology</li> <li>• Pharmaceutical Technology (Biotechnology)</li> <li>• Pharmacy</li> </ul>	<ul style="list-style-type: none"> <li>• Pharmaceutics</li> <li>• Pharmaceutical Technology (Formulations)</li> <li>• Pharmacology and Toxicology</li> <li>• Medicinal Chemistry</li> <li>• Pharmaceutical Technology (Bulk Drugs)</li> <li>• Natural Products</li> <li>• Pharmaceutical Analysis</li> <li>• Biotechnology</li> <li>• Pharmaceutical Technology (Biotechnology)</li> <li>• Pharmacy</li> </ul>



	<p>Practice</p> <ul style="list-style-type: none"> <li>• Pharmaco-informatics</li> <li>• Traditional Medicine</li> <li>• Regulatory Toxicology</li> <li>• Pharmaceutical Management (MBA)</li> </ul>	<p>Practice</p> <ul style="list-style-type: none"> <li>• Pharmaco-informatics</li> </ul>
Hyderabad	<ul style="list-style-type: none"> <li>• Medicinal Chemistry</li> <li>• Pharmacology &amp; Toxicology</li> <li>• Pharmaceutical Analysis</li> <li>• Pharmaceutics</li> </ul>	<ul style="list-style-type: none"> <li>• Pharmaceutical analysis</li> <li>• Pharmaceutics</li> <li>• Medicinal Chemistry</li> <li>• Pharmacology and Toxicology</li> </ul>
Kolkata	<ul style="list-style-type: none"> <li>• Pharmaco-informatics</li> <li>• Medicinal Chemistry</li> <li>• Natural Products</li> </ul>	<ul style="list-style-type: none"> <li>• -</li> </ul>
Rae Bareilly	<ul style="list-style-type: none"> <li>• Pharmaceutics</li> <li>• Medicinal Chemistry</li> </ul>	<ul style="list-style-type: none"> <li>• -</li> </ul>
Guwahati	<ul style="list-style-type: none"> <li>• Pharmacy Practice</li> <li>• Pharmacology</li> <li>• Biotechnology</li> </ul>	<ul style="list-style-type: none"> <li>• -</li> </ul>

NIPER hosts frontline research facilities and service, offering its expertise in the form of

- National Bioavailability Centre
- National Centre for Pharmaco-informatics
- National Toxicology Centre
- Centre for Pharmaceutical Nanotechnology, India
- Medicine Information Centre
- Testing Lab for Stability and Impurity Profiling of Drugs
- Instrumentation Centre for Testing and Analysis
- National Center for Safety Pharmacology
- Pharmaceutical Management

NIPER functions under the Union ministry of Chemicals and Fertilizers. The president of the Republic of India is the visitor of the institute. Its policy architecture is framed and reviewed by a board of governors which includes eminent academicians, members of the parliament and entrepreneurs. The institute is represented by a director, who is also the chief academic and executive officer.

NIPER Mohali campus spans over an area of 130 acres (0.53 km<sup>2</sup>), near the Punjab Cricket Association Stadium of S.A.S. Nagar (Mohali). It is a fully residential institute offering unmarried as well as married hostel accommodation. In

addition, it offers accommodation to the faculty, staff and visitors.

Every year in June, NIPER conducts national level entrance examinations for admissions to its M.S.(Pharm)/M.Tech/M.Pharm., MBA and PhD programs. Candidates interested in MBA (Pharmaceutical Management) and the doctoral programs are further screened by personal interview. The candidates are required to have qualified the Graduate Aptitude Test in Engineering (GATE) or now Graduate Pharmacy Aptitude Test (GPAT) in a suitable subject area, although exceptions are allowed for some programs. Now GATE has been replaced by GPAT and pharmacy graduate has to qualify the GPAT. The entrance examination is conducted at Ahmedabad, Bangalore, Chandigarh, New Delhi, Hyderabad, Jaipur, Kolkata, Lucknow, Mumbai, Nagpur, Pune, and Trivandrum. Depending on the rank secured in the entrance examination and number of seats offered in a department, the applicants get to opt for their choice in a counseling session. NIPER also has reservation for SC, ST, Physically Handicapped and Kashmiri Migrant candidates. Exam for doctoral program is subject and/or department specific. For doctoral studies, normally the PI has sufficient funding to support the student, but in its absence a fellowship via the National Eligibility Test conducted by the University Grants Commission or such student support schemes makes the applicant's case strong. The institutes will run with co-operation from mentor institutes located at the respective places. Ahmedabad (Gujarat), Hajipur (Bihar), Hyderabad (Andhra Pradesh), Kolkata (West Bengal), Rae Bareilly (Uttar Pradesh) and Guwahati (Assam) are the places where the New NIPERs are going to be started around November 2008. However, counseling for these institutes will be held at NIPER, SAS nagar (Mohali), Punjab.

#### NIPER and its Branches in India

##### • NIPER AHMEDABAD

B.V. Patel Pharmaceutical Education and Research Development Centre (PERD) Centre Sarkhej - Gandhinagar Highway, Thaltej, Ahmedabad-380 054, Gujarat, India. [www.nipe-ahmedabad.in](http://www.nipe-ahmedabad.in)

##### • NIPER HAJIPUR

Export Promotion Industrial Park (EPIP) Zandaha Road, Hajipur, Vaishali - 844101, India <http://niperhajipur.ac.in/>

##### • NIPER MOHALI

Sector 67, S.A.S. Nagar



- **NIPER-Hyderabad**

Balanagar

Hyderabad - 500 037, India

E-mail : projectdirector@niperhyd.ac.in

- **NIPER KOLKATA**

Indian Institute of Chemical Biology

4, Raja S. C. Mullick Road, Jadavpur

Kolkata – 700032, India

www.iicb.res.in/niper.html

- **NIPER RAE BARELI**

Shree Bhawani Paper Mill Road,

ITI compound, Rae Bareli,

U.P -- 229010 ,India

http://niperraebareli.edu.in/

- **NIPER GUWAHATI**

Guwahati Medical College & Hospital

Guwahati - 781 032.

Assam., India

www.niperguwahati.org

National Institute of Pharmaceutical Education and Research (NIPER) was established under the aegis of Ministry of Chemicals and Fertilizers, Department of Pharmaceuticals, Govt.of India.

**For recruitment of Director Post of (NIPER) the qualifications are as follows:**

- Candidates having 25 years of research and teaching experience as Institute, faculty or in the pharmaceutical industry, professional or international agencies will be preferred.
- Should have published work in eminent journals.
- Should have worked as Head of the Institute.
- Candidates should be below 55 years of age.
- 

**PCI Clarification on MS Course awarded by NIPER**

Entailing the ongoing controversy over the recognition M.S (Pharm.) program offered by National Institute of Pharmaceutical Education and Research (NIPER); Pharmacy Council of India (PCI) has come out with a clarification that the NIPER'S MS programe has not been specifically commented anytime by the council and is not an issue under the consideration of the body<sup>[8]</sup>.

The Council, in a latest notice , has clarified that the “ PCI has not any time made any specific comments relating to the recognition of post graduation degrees awarded by the NIPER as the same is not an issue under the consideration of PCI.” The clarification was issued under the Pharmacy Act, 1948, nothing the responsibilities of the PCI in the backdrop of

recent press news stating that PCI has not recognized the post graduate degrees awarded by NIPER.

However, the council, detailing its onus as per the act, clarified that the “MS programs offered by any institution /university in the country does not figure as an approved qualification under the Pharmacy Act.”As per the Act, the PCI has the responsibility to frame regulations prescribing the standard of education required for the qualification as a pharmacist, approve the pharmacy institutions for the purpose of practicing the profession and to lay down the norms and standards for pharmacy institutions including qualification and experience of teaching staff desiring to obtain approval of the PCI.The PCI has, accordingly, framed regulations namely Education Regulations, 1991 and Pharm.D Regulations, 2008 which are notified in the Gazette of India. These regulations prescribe the norms and standards for pharmacy institutions including qualification and experience of the teaching staff to be appointed by these pharmacy institutions, says the clarification. Meanwhile, the PCI top officials have refused to comment on the clarification. The non-approval of the particular MS program came up in the end of January, 2010, as the PCI stated that it has learnt about some pharmacy institutions offering two year full-time MS Programs in Industrial Pharmaceutics and Pharmaceutical Analysis & Quality Control to pharmacy graduates and such MS programs are not approved by the PCI either for the purpose of registration as a pharmacist under the Pharmacy Act to practice the profession or any other purpose like teaching in approved pharmacy institutions. A large number of MS students in NIPER have raised voice against the PCI decision, with the support of the NIPER management and the matter was discussed by the Department of Pharmaceuticals for settlement.

**Pharmacy Council of India (PCI)**

The Pharmacy education and profession in India up to graduate level is regulated by the PCI, a statutory body governed by the provisions of the Pharmacy Act, 1948 passed by the Parliament. The Pharmacy Act 1948 was enacted on 4.3.48 with the following preamble- "An Act to regulate the profession of pharmacy. Whereas it is expedient to make better provision for the regulation of the profession and practice of pharmacy and for that purpose to constitute Pharmacy Councils". The PCI was constituted on 9.8.49 under section 3 of the Pharmacy Act.

- Regulation of the Pharmacy Education in the Country for the purpose of registration as a pharmacist under the Pharmacy Act.





- Regulation of Profession and Practice of Pharmacy.
- To prescribe minimum standard of education required for qualifying as a pharmacist.
- Framing of Education Regulations prescribing the conditions to be fulfilled by the institutions seeking approval of the PCI for imparting education in pharmacy. (Ref.: section 10 of the Pharmacy Act)
- To ensure uniform implementation of the educational standards throughout the country.
- Inspection of Pharmacy Institutions seeking approval under the Pharmacy Act to verify availability of the prescribed norms.
- To approve the course of study and examination for pharmacists i.e. approval of the academic training institutions providing pharmacy courses.
- To withdraw approval, if the approved course of study or an approved examination does not continue to be in conformity with the educational standards prescribed by the PCI.
- To approve qualifications granted outside the territories to which the Pharmacy Act extends i.e. the approval of foreign qualification.
- To maintain Central Register of Pharmacists.

The Pharmacy Act 1948 provides for regulation of the profession and practice of pharmacy. The PCI constituted under the act, make regulations called the education regulations prescribing the minimum standard of education required for qualification as a pharmacist. The education regulations for the first time were made in 1953, and revised in 1972, 1981 and 1991. Of recent, the PCI has come up with Pharm.D regulations (2008) which framed under section 10 of the Pharmacy Act, 1948 (8 of 1948) which is approved by the Govt. of India, Ministry of Health and notified by the PCI. The following qualifications are approved by the PCI for minimum qualifications as a registered pharmacist and practice pharmacy in India .

**Table 02: Courses, duration & mode**

Courses	Duration	Mode
Diploma in Pharmacy	2 Years	Full Time (Regular)
Bachelor of Pharmacy	4Years	Full Time (Regular)
Doctor of Pharmacy	6Years	Full Time (Regular)
Doctor of Pharmacy (Post Baccalaureate)	3Years	Full Time (Regular)

The B.Pharm (Hons.) /5 years B.Pharm or B.Pharm (Hons.) is not approved by PCI u/s 12 of the Pharmacy Act, 1948 for the purpose of registration as a pharmacist<sup>[9]</sup> . The registered pharmacist are privileged to write R.Pharm(RP) abbreviation with their names. The PCI considered to design an insignia for use by the pharmacists who were qualified to practice pharmacy. In 1979, the colour scheme of the same was adopted .The two color emblem, provided green colour for the cross and circle surrounding the cross and red color for the letters. The registered pharmacists are encouraged to use this official insignia, termed as green is, would give to the qualified

pharmacists their own identity and help them to maintain their integrity, recognition, dignity and status of professionalism.

**Professional Licensures (PCI):**

- Fresh Registration: U/S 32(2) of the pharmacy Act 1948 (8 of 1948) .
- Reciprocal Registration
- Duplicate Registration
- For issue of duplicate pharmacist registration certificate (Under section 34 of the Pharmacy Act, 1948).
- Renewal of restoration certificate.
- Good Standing Certificate.
- For change of surname.
- Surrender of registration certificate.
- Demise of a registered pharmacist.
- Entry of additional qualifications (Under section 35) of the pharmacy, 1948 [Form E (2) Vide Rule 41(2)].

The state pharmacy councils and registration tribunals are responsible to dispatch certificates<sup>[10]</sup> .

**Role of All India Council for Technical Education (AICTE) in Pharmaceutical Education**

- The Benaras Hindu University, Department of Pharmaceutics was the first pharmacy institution to be sanctioned grant by the AICTE (1950).
- In 1952, L.M. College of Pharmacy, Ahmedabad, for grant-in-aid.
- The Pharmaceutical Education Committee (PEC) of the AICTE met on 13<sup>th</sup> August, 1954.
- The PEC recommended that the 3 years B.Pharm course that existed needed revision to a 4 year integrated course after higher secondary and this recommendation was approved by the coordinating committee (1960) and the council (1961).
- The Master of Pharmacy syllabus was drafted by AICTE in 1960.
- Prof. Harkishan Singh was responsible for establishment of separate All India Board of Undergraduate Pharmaceutical Education and All India Board of Postgraduate Studies and Research in Pharmaceutical Sciences under AICTE (1987).
- AICTE bill was introduced in Parliament in August 1987. The Act came into force from 28<sup>th</sup> March 1988.
- In 1988, the board i.e. U.G. & P.G Pharmacy education came under one board namely All India Board of Technical Studies in Pharmaceutical Education.
- In 1990, the modified board name was All India Board of Pharmaceutical Education.
- The AICTE as such decided to organize the conduct of a separate examination for pharmacy students under the name Graduate Pharmacy



Aptitude Test (GPAT) with effect from academic session 2010-11<sup>[11]</sup>.

### Evolution of Indian Pharmacopoeias in Pharmaceutical Education<sup>[12]</sup>

- The Indian Pharmacopoeia was first translated into Hindustani version in the year 1824. The Hindustani version was prepared "new edition" (1841), which was published in 1843.
- Hindustani version of the London Pharmacopoeias (Ed.1886) by G.G. Spilsbury, Surgeon & Samachurn Dutt, Sub-Assistant Surgeon (1841) done into the Persian from the nagree character with the addition of an Appendix: Containing an abstract of the actions, uses and doses of all the preparations contained in the Pharmacopoeia by Fred J, Mouat, M.D. who was fellow of the Royal College of Surgeons of England, Secretart to the Council of Education which was published from Calcutta, Bishops College Press, 1845.
- The Bengal Pharmacopoeia and General Conspectus of Medicinal Plants, arranged according to the natural and therapeutic systems edited under the section of a special committee by W.B.O'SHAUGHNESSY, M.D.,F.R.S.&C.,Bengal Medical Service, Honorary Fellow of the Royal Medico-Botanical Society of London –Corresponding Member of the Provincial Medical Association of England-of the National Institute of Washington ,& c & c . Which was published by order of government, Calcutta, Bishops College Press, (1844): MDCCCXLIV?
- Pharmacopoeia of India prepared under the authority of her Majesty's secretary of state for India in council by Edward John Waring, M.D., Member of the Royal College of Physicians of London, Surgeon in her majesty's Indian Army, associated by a committee appointed for the purpose (India Office: 1868).
- Supplement to the Pharmacopoeia of India on a catalog of Indian Synonyms of the medicinal plants, products, inorganic and organic substances included in that work with explanatory and descriptive remarks, & c ., in fourteen languages by moodeen Sheriff , G.M.M.C (Graduate of Madras Medical College) ; Native Surgeon in her majesty's Indian medical service which was printed and published by order of Government, at the request of the committee of the Pharmacopoeia of India ( Madras: Printed by B.Morgan , at the Government Gazette Press-1869.
- Indian and Colonial addendum to the British Pharmacopoeia (1898) published under the general council of medical education and registration of the U.K Pursuant the Acts XXI & XXII Victoria Cap. XCI (1862) [Government of Indian Edition 1901].
- The Indian Pharmacopoeial list , Govt. of India , Department of Health printed by the Manager Govt. of India Press; Calcutta (1946).
- The Indian Pharmaceutical Codex: Volume I – Indigenous Drugs (Approved by the Pharmaceuticals and Drug Research Committee) by B.Mukerji, Director, Central Drug Research Institute, Lucknow published by Council of Scientific & Industrial Research, New Delhi (1953).

- First edition of Indian Pharmacopoeia was published in 1955.
- Second edition of Indian Pharmacopoeia was published in 1966.
- Third edition of Indian Pharmacopoeia was published in 1985.
- Fourth edition of Indian Pharmacopoeia was published in 1996.
- Fifth edition of Indian Pharmacopoeia was published in 2007.
- Draft Proposal for Amendments for IP 2014.
- Indian Pharmacopoeia 2010 (Addendum 2012 to IP 2010; Amendment List 3 for IP 2010
- Latest: Indian Pharmacopoeia Commission and United States Pharmacopoeia India Pvt. Ltd.; has jointly organized one day course on "Effectively Using the Pharmacopoeia" held on dated 2<sup>nd</sup> February , 2012 at New Delhi.
- The first edition of the National Formulary of India appeared in 1960. The second edition of the National Formulary of India was published in 1966 and was reprinted in 1974. The third edition of the National Formulary of India was published in 1979. In July, 2010 the experts were worked to publish the pre print version of the fourth edition.

### Indian Pharmaceutical Forums and Journals for Development & Practice of Pharmaceutical Education

- The main aims and objectives of all Pharmaceutical forums are:
- To promote the highest professional and ethical standards of pharmacy this is work for the growth, development and betterment in the field of pharmacy.
- To promote social contacts among pharmacists of the various countries.
- To promote the study and practice of pharmaceutical research and education.
- To edit and publish research journals of pharmacy for spreading and promoting the research scholars and academicians.
- To organize annual convention /symposium/seminar/workshop etc for upgradation of pharmacy professionals.
- To honour eminent professionals engaged for the upliftment of pharmacy profession.
- To develop and meaintain a hub of pharmacy professionals for co-operation with each other.
- The Indian Pharmaceutical Congress Association (IPCA); the federal body of the five associations normally IPGA, IPAA, IHPA, APTI, AIDCOC. The first Indian Pharmaceutical Congress was organized at Calcutta in December 1948 with Professor M.L Schroff as its president. 64<sup>th</sup> IPC will be held between 6<sup>th</sup> -9<sup>th</sup> December, 2012 at Goa.



**Table 03: Name of the Association/Society/Confederation with their Journals (if any)**

Name of the Association/Society	Name of the Journals
Indian Pharmaceutical Association	Pharma Times Indian Journal of Pharmaceutical Sciences (Formerly known as Indian Journal of Pharmacy) Pharma Professional Archives. Drug Information Centre Bulletin.
Indian Hospital Pharmacist's Association (Estd.1963)	Indian Journal of Hospital Pharmacy
Association of Pharmaceutical Teacher's of India (Estd.1966)	Indian Journal of Pharmaceutical Education and Research Indian Journal of Pharmacy Practice APTI Bulletin
Indian Pharmacy Graduates Association (Estd.1973)	IPGA Today
Pharma Helpline Society (Estd.2002)	-----
Indian Pharmacist Association	-----
All India Drugs Control Officer's Confederation	AIDCOC Bulletin
Arunachal Registered Pharmacist Association	-----
Diploma Pharmacist Association, UP	-----
Chattisgarh Pharmacist Association	-----
Jammu and Kashmir Govt. Pharmacist Association	-----
Association of Community Pharmacist's of India	IJCP Journal
Indian Railway Pharmacist Association	-----
Indian Association of Pharmaceutical Scientists & Technologists	International Journal of Pharmaceutical Science & Technology
The Confederation of Indian Pharmaceutical Industry	-----

Pharmacist Employees Association	-----
The Bulk Drug Manufacturers Association (Estd.1991)	-----
Association of Pharmacy Professionals (Estd.2011)	Bulletin of Pharmaceutical Research
Society of Pharmaceutical Education and Research (Estd.2011)	Journal of Advanced Pharmaceutical Technology and Research.
Pharmacist's Association, W.B.	-----
In Pharm Association.	Journal of Pharmacology and Pharmacotherapeutics International Journal of Pharmaceutical Investigation Pharmaceutical Methods Journal of Young Pharmacist's Systematic Reviews in Pharmacy
Organization of Pharmaceutical Producers in India (Estd.1965)	-----
Indian Drug Manufacturers Association (Estd.1961)	-----

### Pharmaceutical Society of India <sup>[13]</sup>

Pharmaceutical Society of India was the oldest pharmaceutical organization which keeps its active membership open only to qualified chemists and druggists /diplomats in pharmacy. A unique society in India of qualified practicing pharmacists passed into history. The qualified chemists and druggists organized themselves into the Pharmaceutical Association in 1923, changing the name to the Pharmaceutical Society of India in 1925. The prominent builders were Wilfred Pereira and A.N. Lazarus. The first president was W.T. Grice. The proposal for appointing a member of the society to the board of examiners for the chemists and druggists and use of the title M.P.S (India) by the diploma holders possibly did not make headway. The members of the society were appending with their names the professional qualification "M.P.S. (India)." The society decided to expand and better project its activities through its own journal. The first



number of the quarterly journal designated as “The Pharmacist” was published in 1939; with K. Venkatapathi Naidu as the editor. A regular publication of the journal dwindled. Possibly the publication could not be sustained for long. No issue of the journal has become available for scrutiny. It comes out that passed compounders were accepted as associate members but they are not allowed to use the M.P.S (I) against their names. In 1949, the society had a membership of 56. The Government of Madras was duly informed about dissolution of the society. The dissolution became effective from 21May 1949.

#### Reputed Organizations (other than pharmacy): Approved Pharmacy Qualifications

- Institution of Chemists (India).
- Indian Chemical Society.
- Indian Council of Chemists.
- Orissa Chemical Society.
- Society for advancement of Electrochemical Science and Technology.
- Society of Life Sciences.
- Society of Biological Scientists of India.
- Indian Society of Analytical Scientists.
- Academy of Sciences for Animal Welfare, India.

#### National Pharmacy Week in India: Highlights the Pharmacy Profession including Pharma Students

The Indian Pharmaceutical Association (IPA), the national professional body of pharmacists, involved in all areas of pharmacy celebrates the National Pharmacy Week each year in the third week of November to highlight the profession of pharmacy as a suitable and rewarding profession, its importance to the field of medicine and the vital role it plays in the medicinal health of the people. The National Pharmacy Week aims to promote pharmacists as health care professionals, who are as essential to a patient’s health as the doctor. Towards this end the IPA organizes various activities to create awareness among people about the importance of pharmacy. It is nearly 50 years since the National Pharmacy Week is being celebrated. All colleges of pharmacy across India, Institutes of pharmacy and their organizations along with their students take enthusiastic part in realizing the aims of the National Pharmacy week. The 2008 celebrations focused on the role of the pharmacist, as a guide to know your medications. The theme for the year was ‘Know your pharmacist for safe use of prescription medicine’. As part of the activities were a seminar on the correct use of medicines, role of pharmacists in assisting a person know the right use of medicines, a blood donation camp. A rally of pharmaceutical students highlighting their contribution to medicine and at the college level a debate, quiz and elocution competitions are held. In 2009 the theme of the National Pharmacy Week was ‘Make Pharmacy your career’. The focus on the activities this year was to promote pharmacy as a career and it targeted students on the verge of deciding a career, their parents and also the general public. The activities included awareness

campus conducted in schools and colleges, distribution of literature about pharmacy, rallies, seminars, career camps, articles in newspapers, blogs and interactive quizzes, programmes and debates. The 2010 National Pharmacy Week the theme was ‘Educate before you Medicate—Knowledge is the best medicine—Talk with your Pharmacist’ The 2011 National Pharmacy week will emphasize on the role and value of pharmacists in the safety and correct use of medicine and their increasing importance as health care professionals. Knowledge is the best cure, and the correct know about drugs and prescription medicine can only be given by a pharmacist and people should hence realize the vital role pharmacists play in maintaining their health. This is the main purpose of the national pharmacy week<sup>[14]</sup>.

**Table 04: Previous NPW Themes**

S. No.	Year	Theme
1	1962	PHARMACY AS A CAREER
2	1963	PHARMACIST SERVES THE NATION
3	1964	PHARMACIST GUARDS THE NATION’S HEALTH
4	1965	PHARMACIST GUARDS THE NATION’S HEALTH IN WAR & PEACE
5	1966	PHARMACIST YESTERDAY, TODAY & TOMORROW
6	1967	GOOD PHARMACIST FOR BETTER MEDICATION
7	1968	HORIZON IN PHARMACY
8	1969	YOUR PHARMACIST & FAMILY PLANNING
9	1970	PHARMACIST AS HEALTH EDUCATION
10	1971	PHARMACIST THE MAKER & MESSENGER OF MEDICINE
11	1972	DEPEND ON YOUR PHARMACIST
12	1973	PHARMACIST FOR COMMUNITY HEALTH
13	1974	PHARMACIST FOR BETTER MEDICATION
14	1975	PHARMACIST FOR SERVICE TO HUMANITY
15	1976	THE PHARMACIST IS YOUR FRIEND IN NEED
16	1977	PHARMACIST FOR WELFARE OF MASSES
17	1978	PHARMACIST A VITAL LINK BETWEEN DOCTOR & PATIENT
18	1979	PHARMACIST FOR CHILD CARE
19	1980	TREAT MEDICINES WITH RESPECT



20	1981	PHARMACIST FOR SERVICE OF THE DISABLED
21	1982	BETTER HEALTH THROUGH DRUG PRODUCTIVITY
22	1983	PHARMACISTS AND YOUR MEDICINES
23	1984	DRUG AWARENESS THROUGH YOUR PHARMACIST
24	1985	PHARMACIST'S VITAL ROLE IN COMMUNITY HEALTH
25	1986	PROFESSION OF PHARMACY FOR A BETTER TOMORROW
26	1987	PHARMACISTS – DRUG ABUSE
27	1988	QUALITY MEDICINES THROUGH PROFESSION OF PHARMACY
28	1989	FIFTY GOLDEN YEARS OF PHARMACEUTICAL CARE
29	1990	PHARMACIST AS A HEALTH EDUCATOR
30	1991	REGULATORY MEASURES – KEY TO HEALTH CARE
31	1992	PHARMACIST – DESIGN AND QUALITY FOR GLOBALISATION
32	1993	PHARMACIST – RESEARCH FOR BETTER MEDICINE
33	1994	BETTER QUALITY OF LIFE THROUGH PHARMACISTS
34	1995	ROLE OF PHARMACIST IN HEALTH CARE
35	1996	PHARMACIST IN TUNE WITH TIMES
36	1997	COMMUNITY PHARMACY IN NEW AGE
37	1998	STORAGE OF DRUGS
38	1999	ASK YOUR PHARMACIST : FOR THE RIGHT ADVICE
39	2000	PHARMACIST SHOULDERING RESPONSIBILITY IN FIGHTING AIDS
40	2001	PHARMACISTS IN HEALTHCARE: COUNSELING FOR WOMEN'S WELFARE
41	2002	IMPROVING ACCESS TO MEDICINES THROUGH PHARMACIST
42	2003	PHARMACISTS FOR THE PROMOTION OF FUTURE FREE OF TOBACCO
43	2004	KNOW YOUR PHARMACIST
44	2005	KNOW YOUR PHARMACISTS
45	2006	SELF MEDICATION: HOW SAFE ? ASK YOUR PHARMACIST
46	2007	KNOW YOUR PHARMACIST : FOR RIGHT USE OF MEDICINES
47	2008	KNOW YOUR PHARMACIST: FOR SAFE USE OF PRESCRIPTION MEDICINES

48	2009	MAKE PHARMACY YOUR CAREER
49	2010	SAFETY FIRST WITH MEDICINES - ASK YOUR PHARMACIST
50	2011	PHARMACIST:A HEALTH CARE PROFESSIONAL

### Pharmaceutical Industrial Training: Potential Boon for Pharmacy Students

“B.Pharm Industrial Training” is most important and also crucial part for any pharmaceutical student’s career. B.Pharm pre final year & final year industrial training as a part of their syllabus to partial fulfillment of the Bachelor of Pharmacy degree. In Industrial Training, students are achieved some technical knowledges about production, quality control, quality assurance, including industrial analysis, packaging technology, bulk drug preparation, regulatory affairs etc. The training also increases the potency of any pharmaceutical students in the field of storage , R & D, F & D, cGMP, TQM, regulatory affairs, IPR etc & give special advantages to interact many experienced persons, new ideas, development of modern skills, proper individual training, related problem solving, increases potential thinking, handling the proper maintenance & also working mentality as well as attitude in pharmaceutical factory. In general recently 1 week ,15 days to 30 days industrial training was observed in B.Pharm level.According to our investigations , 25%-30% students are seriously involved in this industrial training. In every sixty students maximum students achieve one to three industrial training in their B.Pharm .In India, maximum pharmaceutical factories are offering the industrial training programe in various sectors. It was found that those students who achieve maximum industrial training have better knowledge and skills than the others. So, now a day, students must undergo industrial training to achieve their aim, objectives, goals and prosperity.

### Pharmacy Journal Club: Effective for Pharmacy Education in India

Journal club (JC) is a small group method of teaching learning process. It has a very significant role in higher education, professional and technical education including research programmes (Charles et al, 1991). Here a small group (usually up to thirty) individual’s meet at regular intervals to critically evaluate selected current articles and other topics appeared in scientific literature during a certain period. JC is often held in a democratic and informal manner. JC meetings are time-honored method of teaching literature appraisal skills in many residency



programmes. The main goals of a pharmaceutical journal club meetings to promote a culture of reading, analysis and evaluation of published articles among the participants (students, teachers and professionals) with improve the research, education, information, presentation, communication and interaction skills of the members and update their knowledge base in emerging areas of the profession. Amrita School of Pharmacy at Kochi, Kerala is a postgraduate research institute, which is a department of Amrita Vishwa Vidyapeetham University. The library of Amrita School of Pharmacy has more than 35 paid journals and magazines apart from the internet journals and few free journals. Though the school was started in 1996, the Journal Club was started only on 2006. Presently; faculties, research scholars, B.Pharm and M.Pharm students have their own JCs. The total membership of JC varies from 20 to 30 for teachers, research scholars, M.Pharm students and 35 for B.Pharm students. JC for preparing themselves for effective participation in the meeting. Students get a minimum of 15 days notice while teachers get 7 to 10 days notice with prescribed agenda. Each JC meetings duration may be 90 minutes. In this school, it was reported that, the students participation is generally 100 percent whereas faculties' attendance varies from 70 to 100 Percent. Pharmaceutical Journal Club help to maintain the students and teachers updated in the latest trends and advances in continuing pharmaceutical education<sup>[15]</sup>.

#### **GATE vs. GPAT: Pharmaceutical Education Competitive Examination in Tune with Times**

Graduate Aptitude Test in Engineering (GATE); Pharmacy is the oldest version of Graduate Pharmacy Aptitude Test (GPAT). Actually, the GPAT examination is required for admission to the full time two year M.Pharm program in institutes across the country. Now, GATE pharmacy already fossils now a day which was all India based examination conducted by IISc Bangalore, and/or seven IITs behalf of NCB -GATE, Department of education, MHRD, Govt. of India. The examination was conducted every year from 1987 to 2009. Previously before 1987; the M.Pharm admission was taken purely based on candidates B.Pharm marks, written test and interview which was conducted by the respective institute. GATE qualified students are entitled to a monthly scholarship of INR 5000. The syllabus of GATE has been distributed into seven subtopics. The GATE question paper was totally MCQ's type. The duration of this examination was 3 hours and 150 marks question were found. M.Pharm is too much important alternatives for B.Pharm, final year appeared or pass out students<sup>[16]</sup>. So, GATE Pharmacy was the only process to identify meritorious students for admission to M.Pharmacy at the national level. Maximum number of questions was asked from Pharmacology, Medicinal Chemistry, medium number of questions was asked from Pharmaceutics, Pharmacognosy and maximum number of questions was asked from Pharmaceutical Analysis, Microbiology, Pharmaceutical Jurisprudence and Ethics, Biochemistry and Clinical Pharmacy. The question paper contain 90 number of objective questions,

out of these question 1-30 carry one mark and Q. 31-90 carry two mark each. No alternative questions were observed. In this examination, for each wrong answer 0.25 marks from Q. 1-30 AND 0.50 marks from Q.31-90 were deducted. Vinay Sonawane, a pharmacy student was informed by the IITs that they would stop conducting GATE for pharmacy students after 2009, after an application was filled by him under the Right to Information (RTI) Act. Now, students will have to move towards private colleges where academicians fear, admission standards will be compromised. S.C.Saxena, Director of IIT Roorkee confirmed that, the decision to discontinue the entrance test had been taken by the national coordinating committee. "The IITs and IISc have to depend on faculty members from other pharmacy colleges to conduct the test and it is getting more and more difficult to ensure that outside faculty members maintained the same standards as ours", added Gautam Barua, Director IITs have been the conducting body of the GATE examination but never offered the same course at its campuses. The decision, however, has angured students who now plan to take the matter up with the Human Resource Development (HRD) Ministry as "the exam maintained merit and fairness in the admission process". Pharmacy students from the second-largest proportion of GATE aspirates after engineering graduates. Last year, about 20000 students took the GATE for pharmacy. Graduate Pharmacy Aptitude Test (GPAT-2012) is an all India Examination to be conducted by The Maharaja Sayajirao University of Baroda, Vadodara on behalf of All India Council for Technical Education, New Delhi. The Scores in Graduate Aptitude Test for Engineering (GATE) have been in use till the year 2010 for admission in Master's Programme in Pharmacy (M. Pharm) and also for awarding fellowships/scholarships to Pharmacy Graduates along with engineering graduates. The Organizing Committee for GATE expressed its inability to include Pharmacy graduates in GATE with effect from the year 2010, owing to operational problems due to large number of candidates appearing for GATE examination. Therefore, in order to facilitate admission of Pharmacy graduates in M. Pharm and also to award fellowships/scholarships to Pharmacy graduates, AICTE decided to organize and conduct an examination in the name of Graduate Pharmacy Aptitude Test (GPAT) with effect from academic year 2010-11. Accordingly, a National Monitoring Committee (NMC) was constituted for monitoring the issues pertaining to the policy as well as conduct of GPAT examination. On the recommendation of the National Monitoring Committee for GPAT (GPAT-NMC), the onus of conducting the first GPAT examination i.e. GPAT-2010 and the subsequent one i.e. GPAT-2011 was given to The M. S. University of



Baroda, Vadodara by All India Council for Technical Education, New Delhi. The responsibility of conducting the third consecutive GPAT examination i.e. GPAT-2012 examination has also been given to The M. S. University of Baroda, Vadodara. The M. S. University of Baroda, Vadodara is the sole authority for conducting GPAT-2012 Examination on behalf of AICTE, New Delhi, throughout the country, and declaring the result for GPAT-2012 Examination. Admission to postgraduate programmes with MHRD and other government scholarships/assistantships in pharmacy colleges/institutes is open to those who qualify through GPAT. Candidates, who qualify GPAT examination and have Four years Bachelor's degree in Pharmacy, are eligible for admission to Masters/Doctoral programmes in Pharmacy. To avail the scholarship, the candidate must secure admission to such a postgraduate programme, as per the prevailing procedure of the admitting institution. However, candidates with Master's degree in Pharmacy may seek admission to relevant Ph.D. programmes with scholarship/assistantship without appearing in the GPAT examination. Some institutions specify GPAT qualification as mandatory even for admission of self-financing students to postgraduate programmes. GPAT qualified candidates are also eligible for the award of Junior Research Fellowship in CSIR Laboratories and CSIR/UGC sponsored projects. Eligibility Bachelor's degree holders in Pharmacy (4 years after 10+2, including lateral entry candidates) and those who are in the final year of B. Pharmacy course are eligible for appearing in GPAT-2012 examination. Now, GPAT is only tool to estimate the meritorious candidates for admission to M.Pharmacy at the national level which is conducted by AICTE, New Delhi. We will hope this examination is very fruitful for next generations who are interested to pursue their M.Pharmacy degree through GPAT. But some questions are arises. Why IITs or ITSCs are not conducted this examination? Why AICTE, New Delhi (Why not PCI, New Delhi) take responsibility for this matter? We think only time will give the proper answer with illustrations and justifications<sup>[17]</sup>.

#### Pharmaceutical Quality Improvement Programme

Pharmaceutical Quality Improvement Programme (Pharmacy) was started by AICTE in the year 1999 with a view to uplift the qualifications and skills of teachers of pharmacy colleges across the country(AICTE,2009).Presently, 10 approved QIP pharmacy nodal centres are available in India(Agarwal,2010)..The QIP consists of two types: Upgradation of qualification of teachers from D.Pharm to B. Pharm and/or B. Pharm to M.Pharm/Ph.D (Pharm) and the second is short term programe i.e:1 week,2 weeks, 3 weeks, 4 weeks.The teacher of various AICTE approved pharmacy colleges were benefited by these programs. Full-time, regular / permanent faculty members of AICTE approved Pharmacy colleges are only eligible to apply for admission in M.Pharm (candidates should have a first class degree or 60% in aggregate wherever class is not awarded) with minimum of two years teaching experience as a full-time regular / permanent faculty of AICTE approved Degree / Diploma level Pharmacy Institutions and Ph.D in pharmacy (candidates

should have a First Class M.Pharm in the appropriate branch of specialization in Pharmacy from a recognized Institution / University with minimum three-years teaching experience as full-time regular / permanent faculty of AICTE approved Degree / Diploma level Pharmacy Institutions) . For the uplifting of knowledge and skills of teachers, every centre is required to conduct two courses of one or two week's duration for minimum 30 teachers in a year. Instead of Pharmaceutical QIP; the AICTE /UGC sponsored Faculty Development Program (FDP), Staff Development Program (SDP), convention, seminar, workshop, symposium, conference also organized by various institutes for upgradation of pharmacy education day by day<sup>[18,19]</sup>.

**Table 05: QIP Centres in India**

Sl.No	Name of the coordinator and e-mail ID	Centres name & address
1	Prof. S.S Agrawal Chief Coordinator qipdipsar@yahoo.com, agrwal_shyam@indiatimes.com	Delhi Institute of Pharmaceutical Science & Research Pushp Vihar, Sec-III, M.B Road, New Delhi - 110017
2	Prof.K.Chinnaswamy jsspooty_qip@rediffmail.com	J.S.S College of Pharmacy Rockland, P.B No. 20, Ootacamund-643001, Tamilnadu
3	Prof.K.R Mahadik krmahadik@rediffmail.com	Poona College of Pharmacy, Bharati Vidyapeeth University Erandwane, Pune-411038, Maharashtra
4	Prof. M. Sarangapani mandasarangapani@yahoo.co.in	University College of Pharmaceutical Sciences, Kakatiya University, Warangal - 506009 Andhra Pradesh
5	Prof. D. Sasmal dsasmal@bitmesra.ac.in	Dept. of Pharmaceutical Sciences, Birla Institute



		of Technology, Mesra, Ranchi- 835215, Jharkhand
6	Prof. (Mrs.) S. J. Rajput ghpatelpharmacy@yahoo.com srajput@rediffmail.com	Centre for Post-Graduate Studies & Research in Pharmaceutical Sciences, M.S. University of Baroda, Shri G.H.Patel Pharmacy Building, Donor's Plaza, Nr. FDI, Fatehgunj, Vado dara-390002
7	Dr. F.V. Manvi principal@klepharm.edu	K.L.E's College of Pharmacy, J.N.M.C Campus, Nehru Nagar, Belgaum-590010, Karnataka
8	Prof. Biswajit Mukherjee biswajit55@yahoo.com	Department of Pharmaceutical Technology, Jadavpur University, Kolkata-700032, West Bengal
9	Prof. N. Udupa n.udupa@manipal.edu	Manipal College of Pharmaceutical Sciences, MAHE, Madhav Nagar, Manipal - 576104, Dist.-Udupi, Karnataka
10	Prof. M. D. Kharya mail2dops@gmail.com profkharya1973@rediffmail.com	Dept. of Pharmaceutical Sciences, Dr. Harisingh Gour Vishwavidyalaya, Sagar-470003 Madhya Pradesh

#### Recent Demands and Need Changes in Pharmaceuticals <sup>[20]</sup>

- Need Changes in Food Safety & Standard Act-2011-- because Educational Qualification(Pharmacy Degree)deleted in selection criteria of Food Inspector...For that Recently we lost of Pharmacists post(400+) as Food Inspector in UP State & also

Gujarat state...Parliament Standing committee-Ministry of Health F&W, take this decision...so we need correction & put pharmacy degree in Food Safety & Standard Act-2011.

- Need Changes in Drug & Cosmetic Act- Rule -64, whole sale of Drug Licence-Issued only to Registered Pharmacists..Other qualification should be deleted & In Rule--65, Retail sale of Drugs Licence, Issued as Proprietor, Partner or Director Should be Registered Pharmacists.. Other qualification should be deleted ... If changes occur Lakhs of Pharmacists Employment generation should be created.
- Need Changes in Drug & Cosmetic Act-Rule -71 & 76,Renewal of Manufacturing License, Educational qualification must be in Graduate of Pharmacy..Other qualification should be deleted...& fix Pay scale.
- Employment Generation of Pharmacists in NRHM (Primary health centre & Community health centre), & there is a need of Cadre formation for existing working pharmacists in hospitals. This will open the doors for Pharm .D pharmacists in hospitals and at the same time B. Pharma pharmacists will also get a govt. job other than just Drug Inspectors. Proposed cadre will have posts starting from Pharmacist to Director (Pharmacy).
- Formation of Indian Pharmaceutical Services...(this create Social Status for Pharmacists Jobs)
- Formation of Ministry of Pharmaceuticals, all Regulatory frame work come under one roofs i.e(DCGI,IPC,
- PCI,NPPA, NIPER, PHARMAEXCIL, all Psu units (IDPL,HAL,RDPL,KAPL,BCPL).
- Need Changes in Pharmacy Act:\*all Pharmacy Education at all levels (D.Pharma, B.Pharma, M.Pharma, Pharm.D) should be Regulated and controlled by one body, i.e-Pharmacy Council of India.\*Uniformity of Syllabus, Implemented in country wise..Control by- Pharmacy Council of India.\*Regulation with Ref.to appointment of faculty, PCI shall work, suggest creation of post for all professionals as per there educational qualification.
- Need Changes in NIPER ACT: The Director post should be basic in pharmacy.

#### Pharmaceutical Education Quality Vs Maladies

The problems of pharmaceutical education in particular, have been vast and endless in India. Quality change relationship is valid point for the current pharmacy education scenario. While colleges individually define and implement quality instruction, it is the dual regulation by PCI and AICTE that assures quality <sup>[21]</sup>.





The recent press release that the competitive GATE examination will not be there for pharmacy graduates from 2010 onwards and pharmaceutical education will be out of the AICTE umbrella are equally causes of concern. All these issues need wider professional debate<sup>[22]</sup>.

The following points are worth-contemplating for the intended changes.

1. Information based education to competency based education.
2. Quality Control to Quality Assurance in Education.
3. Approval to Accreditation of Educational Institutions.
4. Good Quantity Vs. Good Quality in Institutions.
5. Teachers committed to Quality and Excellence.
6. Improved Student Receptivity and Discipline.
7. Flexible and Update Curricula.
8. Adoption of Innovative Teaching Methods logies.
9. Continual flow of Education Programs.
10. Quality of Appraisal Systems.
11. Use of Quality Assessment tools.
12. Academic Exchange and Collaboration.
13. Implementation of Good Educational Practices (GEP):

- Encourage Active Learning
- Furnish Prompt Feedback
- Develop Mutual Co-operation
- Encourage contact between teachers and the taught.
- Emphasize on Punctuality and Regularity
- Generate High Expectations
- Respect Diverse Talents and Ways of Learning.

The recommendations on GEP provide a conceptual framework for the design, implementation and assessment of contemporary education program for pharmacists throughout. The institutions to inculcate the quality standards and to meet the demand of excellence in the professionalism must adopt the principles of GEP. Being as the recipe of excellence, GEP will not only impart quality standards but it will also take away the pharmacy education to a new horizon<sup>[23]</sup>.

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#### **AUTHORS' CONTRIBUTIONS**

Authors contributed equally to all aspects of the study.

#### **PEER REVIEW**

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#### **CONFLICTS OF INTEREST**

The authors declare that they have no competing interests