



## An Ontological Cluster on Bangladeshi and Indian Pharmaceutical Courses: Basics to Advances

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### Review Article

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### Abstract

In our advanced world, pharmaceutical education has evolved great importance for all professional sectors. A properly designed pharmacy education system may be utilized and improved health care society; selection, utilization and optimization of drug therapy; manufacturing sectors ; research, development & formulations; herbals; homeopathy ; unani; veterinary; cosmetology; nanopharmaceuticals; drug discovery; quality control & quality assurance with pharmaceutical marketing management as well as industrial sector . So selection of proper pharmaceutical courses is too much essential nowadays for pharmaceutical beginners as well as students according to their interest of this particular area and also market needs. In these studies, the various Bangladeshi and Indian pharmaceutical courses were discussed properly for pharmaceutical students (and/or beginners) to achieve their own planning, goals and destination.

**Keywords:** *Ontological, Cluster, Bangladeshi, Indian, Pharmaceutical courses.*

### Introduction

Recent development of pharmacy academics has the potential to improve the students' quality and also upgraded their professions in various sectors <sup>[1]</sup>. In Bangladeshi history, the pharmacy education was started

in 1964 after the establishment of Department of Pharmacy, University of Dhaka (then East Pakistan)<sup>[2]</sup>. Now, Indian history the first pharmacy class was started at Madras Medical College in the year of 1860 but it was not a professional pharmacy course <sup>[3]</sup>. 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 course studies included Pharmacy, Pharmaceutical chemistry, Pharmacognosy, german & pharmaceutical economics. But, the Human physiology & Pharmacology were not included <sup>[4, 5]</sup>. In 1940, the BHU started M. Pharm research degree. In 1949, 2 years D. Pharm was started at Institute of Pharmacy, Jalpaiguri, West Bengal in India <sup>[6,7]</sup>.

In Bangladeshi pharmacy education, Department of Pharmacy, University of Dhaka was started 3 years B. Pharm course. Thereafter, it was upgraded to 4 year B. Pharm (Honors) course from 1996. Then, the 1 year M. Pharm course was introduced by the same department from 1970 under two groups: thesis and non-thesis <sup>[2]</sup>. In pharmaceutical education history, pharmacy as a profession was recognized in Bangladesh after the promulgation of Bangladesh Pharmacy Education-1976 and in India, Chopra Committee recommended for promulgation of Drugs Act and Pharmacy Education (1931) as well as in 1946. Bhora Committee extended recommendations for Pharmacy Act and uniform Pharmacy Education in India. After that, Indian Pharmacy Act was passed in the parliament (1948).

### ACCREDITATION OF PHARMACY SCHOOLS/COLLEGE/ DEPARTMENTS/ INSTITUTIONS/PARISHADS <sup>[2, 8]</sup>:

#### In India:

1. They should be approved by Pharmacy Council of India (PCI), New Delhi (For Registered Pharmacist).
2. They should be approved by All India Council for Technical Education, New Delhi.
3. They should be ISO certified.
4. They should be approved by State Government or State Board or Council of Technical Education or equivalent.



5. They should be affiliated to UGC recognized or State Act established university or parliament Act established autonomous institution or parishad or university or equivalent.
6. They should be approved by Committee for the purpose of Control and supervision of experiments of animals (CPCSEA)-Ministry of Environment and Forests, department of Animal Welfare, Government of India for registration as an establishment for conducting experiments using laboratory animals for education and research.

#### **In Bangladesh:**

1. They should be affiliated to UGC, a commission created according to the Presidential Order (P.O. No. 10 of 1973) of the Government of the People's Republic of Bangladesh.
2. They should be approved by Pharmacy Council of Bangladesh (PCB) under the Ministry of Health and Family Welfare promulgated Pharmacy Ordinance (No. XIII) in 1976 for the purpose of registration of pharmacists. The PCB started 'A grade' registration system for the pharmacy graduates of different universities in 2005 after passed the examination and after that they are eligible to practice Pharmacy in Bangladesh. The PCB provides 'B grade' registration after passing Diploma of Pharmacy (D. Pharm) and no separate examination is arranged to provide registration.
3. They should be approved by the animal ethics committee.
4. They should be approved by PCB (for 'C grade' pharmacists who are interested to work in community pharmacy and run their own pharmacies.

#### **BASIC DIFFERENCES BETWEEN BANGLADESHI AND INDIAN PHARMACEUTICAL COURSES:**

1. In Bangladesh, the students who have completed 10<sup>th</sup> education in science group are eligible to get admission into 3 years Diploma of Pharmacy course. But in India, those who have completed 12<sup>th</sup> class education (science group) with Physics, Chemistry, Biology/Physics, Chemistry, Mathematics combination are eligible to get admission into 2 years D. Pharm course.
2. In Bangladesh, those who have passed 10<sup>th</sup> in any group can take 3 months special courses designed and jointly conducted by Bangladesh Pharmaceutical Society<sup>9</sup> and Bangladesh Pharmaceutical Chemists and Druggists Society<sup>10</sup> can sit for the examination. Those who passed this course are categorized as "C grade"

pharmacists by PCB. In India, no initiative was taken by any society or association or PCI.

3. In Bangladesh, 4 years B. Pharm (Honors) courses are available. In India, 4 years B. Pharm courses are also available. In Bangladesh at University of Dhaka offered 5years B. Pharm(Hons) programme, but the authority tried this five years course converted to 5 years Pharm.D programme - after final approval from Bangladesh Pharmacy Council.
4. In Bangladesh, 1 year Master of Pharmacy (thesis and non thesis group) courses are available. In India, 2 years Master of Pharmacy and /or with specification is available.
5. In Bangladesh, MS (Pharmaceutical Technology) courses are available instead of M. Pharm. The 1 year MS course is conducted by the University of Asia Pacific, Dhanmondi, Dhaka. In India, many courses are available instead of 2 years M. Pharm.
6. In Bangladesh, no Pharm. D. (Doctor of Pharmacy) is available. In India, 3 years Pharm. D. (Post Bacalaureate) courses after B. Pharm and 6 years Pharm. D. courses are available in various Indian Universities according to International Standard.

#### **ONTOLOGICAL CLUSTER ON BANGLADESHI PHARMACEUTICAL COURSES WITH INSTITUTES / DEPARTMENTS / UNIVERSITIES EXAMPLES**

1. Certificate courses in Pharmacy ( Grade C Pharmacist)
2. Diploma in Pharmacy (3 years) e.g. Institute of Health Technology
3. Bachelor of Pharmacy (Hons) [4 Years] e.g. Department of Pharmacy, University of Dhaka
4. Bachelor of Pharmacy (Hons) [5 Years] e.g. Department of Pharmacy, University of Dhaka
5. Master of Pharmacy (1 Year) e.g. University of Science and Technology, Chittagong
6. Master of Philosophy in Pharmacy (2 Years) e.g. University of Dhaka
7. Doctor of Philosophy (Pharmacy) [2-5 years] e.g. University of Dhaka
8. Master of Science (Pharmaceutical Technology) [1 Year] e.g. University of Asia Pacific, Dhaka.

#### **ONTOLOGICAL CLUSTER ON INDIAN PHARMACEUTICAL COURSES WITH INSTITUTES / DEPARTMENTS / UNIVERSITIES EXAMPLES**

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).

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

## 2. Diploma Courses:

- (a) Diploma in Ayush 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.

## 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.

## 4. Master of Science Courses:

- (a) Integrated B.Sc. and M. Sc. In Pharmaceutical Sciences (5 Years) e.g. Apeejay Styra University.
- (b) M.Sc. in Pharmaceutical Sciences (2 Years) e.g. Apeejay Styra 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.

## 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.

**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 Pharmaceuticals (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.

- (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.
- (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.

## Conclusion

Pharmaceutical education is changing with time and day by day it is utilized for social and health care system. The pharmacy education institutes need to restructure their training practices which include improved human relation, IT applications in Research and Development, F&D. The value of pharmacy profession is in developing and implementing value based health care services by producing quality medicines.

The pharmacists require persistent dedication, visualization and proper planning<sup>[11, 12]</sup>. Lastly, this design may deliver vast knowledge for pharmaceutical students (and/or engineers) to choose their appropriate careers in all Bangladeshi and Indian pharmaceutical courses. The review also helps for pharmaceutical students (and/or engineers) to achieve their own planning, goals and destination as well as to establish their bright future in pharmacy and allied fields.

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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