



Evolution and Evaluation of Pharmaceutical Education in India

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ABSTRACT

India has been a country with a rich and glorious past. It was the nodal centre of Education, Trade and Business for centuries together and ample literature is available to corroborate the same. Interestingly India also has been the mother of the modern age Medical Sciences as Ayurveda originated here and was practiced here before the world knew about any other therapy for treating human beings and animals. The education system in India from the very beginning was skill and practice based. Pupils (Shishya) used to go to the teachers house (Gurukul) to learn various skills of the trade. Due to the exposure from various rulers and to keep pace with the industrial revolution and standardisation in various systems and processes worldwide during the 19th and the 20th century onward, India has seen a rapid change in the education system and more specifically medical education and its allied branches. India today is a hub of Pharmaceutical Industry and has thus impacted the Pharmaceutical education sector to a large extent. Unlike the western world, the Indian pharmaceutical education is industry based rather than practice based. This paper reviews the evolution of pharmaceutical education in India and presents an overview of its development. It also analyses the current scheme of post-graduate education in pharmaceutical sciences with its evolution and relevance to the industry requirements.

Keywords: Pharmaceutical education, Industry based curriculum, Pharmacy Practice, Employability.

INTRODUCTION

India has been a country with a glorious past in various disciplines of knowledge which includes Pharmaceutical Sciences. The concept of Pharmacy evolved and was practised in ancient India. Ayurveda (Science of Life) and Siddha originated in India. The sources of drugs at that time were herbs and animals. Standardisation methods existed for converting herbs or animal extracts into potent medicines. Ayurveda then, was mostly practised by sages for the well-being of the mankind and was not exploited commercially. According to Hindu mythology, Lord Bramha was the first teacher who wrote about Ayurveda and defined it as the science of life. In 5000 B.C¹ Charaka and Sushruta spread the message of Ayurveda and educated people about its use and effectiveness².

The opening of a chemist shop in 1811 by Scotch in Bathgate, Kolkata was the start of pharmacy profession or practice in India. In 1870, a training programme for the chemists was started by the Madras Medical College which was later converted to a Diploma programme. Similarly a one-year training course was also started for dispensing medicines through the Bengal Municipal Act, 1984³. This laid the foundation of the pharmaceutical education in India. Since then the Pharmaceutical education has undergone a radical change. This paper is a genuine attempt in reviewing its evolution and its relevance to the present scenario.

Dawn of Modern Pharmacy Education

The year 1899 saw the dawn of modern Pharmaceutical Education. It was in this year that the modern pharmacy

institutions commenced functioning for training of pharmacists in Chennai (then Madras). In 1928 the Medical Faculty of Bengal followed suit and started similar training programmes⁴.

The systematic and well defined University education was initiated in 1932 when the Banaras Hindu University pioneered the pharmaceutical education under the guidance of Professor M. L. Shroff, the father of pharmaceutical education in India. Pharmaceutical Chemistry was introduced as a subject in the B.Sc Degree course in this year. A two year course of B.Sc Pharmaceutics was also introduced later. This further lead to the introduction of a three year Bachelor of Pharmacy (B.Pharmacy) course in 1937 at the Banaras Hindu University. The curriculum included Pharmacognosy, Pharmaceutical Chemistry and German & Pharmaceutical Economics. In 1940, a Master of Pharmacy (M.Pharm) research Degree was also introduced³.

Subhadra kumar Patni and Gorakh prasad Shrivastava became the first Pharmacy graduates in 1940 and post-graduates in pharmacy in 1943 respectively. Similarly Shevohari Lal became the first Ph.D holder in 1953 from the University of Patna⁴. The list of first ten Pharmacy colleges and Universities offering degree programmes in Pharmacy are listed in Table. 1, year wise.

The enactment of Pharmacy Act, 1948 founded the statutory regulation of pharmacy institutions in India. This was followed by the establishment of the Pharmacy Council of India by the Ministry of Health in 1949 and the first education regulation was framed in 1953.



Table 1: List of first ten institutions offering courses in Pharmaceutical Sciences with their year of establishment.

S.No	Name of University / College	Year
1	Department of Pharmaceutical Engineering, Institute of Technology, Banaras Hindu University	1937
2	University Institute of Pharmaceutical Sciences, Punjab University, Chandigarh	1944
3	L. M. College of Pharmacy, Ahmedabad	1947
4	Department of Pharmacy, Madras Medical College, Madras	1950
5	Birla Institute of Technology and Science, Pilani	1950
6	College of Pharmaceutical Sciences, Andhra University, Vishakhapatnam	1951
7	Department of Pharmaceutical Sciences, Dr. Harisingh Gour University, Sagar	1952
8	Department of Pharmaceutical Sciences, Nagpur University, Nagpur	1956
9	Department of Pharmaceutical Sciences and Technology, Institute of Chemical Technology	1958
10	Department of Pharmaceutical Technology, Jadhavpur University	1963

These regulations were subsequently amended in 1972, 1981 and 1991 respectively. These bodies prescribed the minimum qualifications for being a registered pharmacist⁵. The curriculum in those initial years included Pharmaceutical Chemistry and Analytical Chemistry and has subsequently evolved over a period of time to suit the requirements of various stakeholders, primarily the pharmaceutical manufacturing industry^{6,7}.

Present Scenario

Due to the incremental growth of Pharmaceutical Industry in India, there has been a rapid expansion in the pharmaceutical education sector as well. The current status of post-graduate Pharmacy education in India is as summarised in Table.2.

Apart from the regular specialisations like Pharmaceutics, Quality assurance etc. many sector specific specialisations have been introduced taking into consideration the requirements of the industry, which includes Pharmacoinformatics, Regulatory affairs, Medical Devices, Pharmaceutical Management to name a few.

India has been a hub of pharmaceutical manufacturing from the past three decades and is growing rapidly. It is expected to reach the 30 billion dollar mark by the year 2021⁹.

Table 2: Status of Post-Graduate Pharmacy education in India⁸

Year	Number of Institutes	Number of Faculty	Total Intake	Enrolment	Students Passed	Students Placed
2012-2013	822	6100	45947	20995	16421	8451
2013-2014	842	7596	51455	19997	16687	8831
2014-2015	845	8753	54540	18169	14631	7403
2015-2016	834	8413	50328	16145	-	5777
2016-2017	820	9678	46134	-	-	-

It has thus impacted the content and the course curriculum of graduate and post-graduate courses in Pharmaceutical sciences across Public and Private Universities in India. Unlike our counterparts in the United States and Europe where it is mostly practice based^{10, 11}. The PCI through an amendment to the Pharmacy Act in 2008, paved the way for the Pharm. D. (Doctor of Pharmacy) course in India. The Pharm.D course focuses on Pharmacy Practise and emphasises the role of a pharmacist as one of the major stakeholder in the health care delivery infrastructure. JSS College of Pharmacy, Mysore was one of the first to start the Pharm. D course. According to PCI there are 165 colleges offering 4950 seats for the Pharm.D course in the year 2016-2017⁵. The current status of Pharm.D course in India is summarised in Table. 3.

Premier Institutes offering Post-Graduate Courses In Pharmaceutical Sciences

With a view to create institutes of higher learning with world class infrastructure and delivering affordable education to masses in the field of Pharmaceutical Education, the Ministry of Chemicals and Fertilizers, Government of India has established seven premier institutions by the name National Institute of Pharmaceutical Education and Research (NIPER) offering various post-graduate courses in Pharmaceutical sciences since 1998. The first NIPER was set up at SAS Nagar, Mohali, Punjab followed by six more in the year 2007. The list of these institutions of national importance along with their year of establishment is given in Table. 4. Four more NIPER's were announced in the year 2015 and will commence operations soon.

NIPER's offer a two year M.S degree in fourteen disciplines including Medicinal Chemistry, Pharmacology & Toxicology, Pharmaceutical Analysis, Clinical Research,



Natural Products, Pharmaceutical Analysis, Pharmacy Practice, Biotechnology, Pharmacoinformatics, Medical Devices, Pharmaceutics, Quality Assurance, Regulatory Toxicology, Traditional Medicine. NIPER Mohali also offers a Master's Programme in Pharmaceutical Management. Admissions to NIPER's are held in June-July on the basis of the score of a National Level Entrance test called as the NIPER Joint Entrance Test. Whereas, admissions to M.Pharm courses of Universities are done on the basis of the students score in Graduate Pharmacy Aptitude Test (GPAT) conducted by the AICTE or a Common Entrance Tests (CET) conducted by the respective states.

Table 3: Number of colleges conducting Pharm.D course (State wise)

State	Number of Colleges	Number of Seats
Andhra Pradesh & Telangana	57	1710
Gujarat	06	180
Haryana	01	30
Karnataka	43	1290
Kerla	18	540
Madhya Pradesh	02	60
Maharashtra	07	210
Punjab	03	90
Rajasthan	01	30
Tamilnadu	24	720
Uttar Pradesh	02	60
Uttarakhand	01	30

Table 4: List of NIPER's with their year of establishment.¹²

S.No	Name of the Institute	Year of Establishment
1	NIPER Mohali	1998
2	NIPER Ahmedabad	2007
3	NIPER Hajipur	2007
4	NIPER Kolkata	2007
5	NIPER Hyderabad	2007
6	NIPER Guwahati	2007
7	NIPER Rai Bareli	2007
8	NIPER Nagpur	Under process
9	NIPER Rajasthan	Under process
10	NIPER Chhattisgarh	Under process
11	NIPER Tamilnadu	Under process

Critical Evaluation of Pharmacy Education

Private Unaided affiliated institutions offering post graduate education in pharmaceutical sciences outnumber the government or aided institutions in India. With the liberalisation of the education policy, many private universities are being set up and most of them

offer graduate and post graduate education in pharmaceutical sciences, thus making pharmaceutical education sector as one of the potential areas of employment after the industry^{1,13}.

It is beyond doubt that pharmaceutical education has made speedy expansion and progress in its various forms. But how far have we succeeded in accomplishing our objective or are we still lagging behind is a debatable issue¹⁴. The curriculum is still far from establishing collaborations with the Industry and its requirements especially given the constraints in which most of the institutions operate.

Technology needs to be used adequately so that trained pharmacists could rise to the occasion for playing an important role in the health care sector nationally and globally. We have failed greatly in this regard since the education sector in general is where the concept of using technology to increase productivity remains a not-so-important proposition^{15,16}.

Pharmaceutical education should come out of the traditional mode and needs to gear up to fulfil the present day requirements of the industry and society in general. Despite of efforts being taken by various regulatory bodies, the pharmaceutical industry have always voiced for not being able to get readily employable students who could turn productive in a short span of time for them. Moreover, the way in which the Indian healthcare industry is progressing, we would see an increased demand for practising pharmacists, who would assist the physicians and patients and would be one of the most important stake-holder in the system. The manufacturing industry though, would remain the most promising area of employment for years to come.

The Pharmaceutical education in India thus needs to focus, not only on developing theoretical and technical knowledge but should to a large extent focus on actual technical skills and acumen required by the Industry, for making students employable.

As far as practice based education is concerned, technical knowledge, establishing and maintaining good relationships with patients and physicians would be of prime importance. Unfortunately it is awfully lacking today. It also requires adequate attention towards clinical efforts in the hospital and the involvement of Pharmacists as an integral part of the healthcare delivery system.

CONCLUSION

The pharmaceutical education sector needs a paradigm change to meet the ever growing and ever changing requirements of the pharmaceutical industry. Sincere efforts by all the stakeholders are required to raise the level of pharmaceutical education and to produce graduates and post-graduates who are employable and productive from day one. Active participation of the industry in training the students and teachers is highly desirable. Revision of curriculum at timely intervals with



active inputs from the industry is required to achieve this herculean task. Moreover, intervention by the Government and Regulatory bodies is essential to place pharmacists in an appropriate role and position to strengthen the health-care delivery systems in India.

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