

**A Text Book Of**

# **PHARMACEUTICS - I**

***As Per PCI Regulations***

**FIRST YEAR B. PHARM.  
Semester I**

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# Syllabus

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## Unit I [10 Hours]

- **Historical Background and Development of Profession of Pharmacy:** History of Profession of Pharmacy in India in relation to Pharmacy Education, Industry and Organization, Pharmacy as a Career, Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeia.
- **Dosage Forms:** Introduction to Dosage Forms, Classification and Definitions.
- **Prescription:** Definition, Parts of Prescription, Handling of Prescription and Errors in Prescription.
- **Posology:** Definition, Factors Affecting Posology. Pediatric Dose Calculations based on Age, Body Weight and Body Surface Area.

## Unit II [10 Hours]

- **Pharmaceutical Calculations:** Weights and Measures – Imperial and Metric System, Calculations involving Percentage Solutions, Alligation, Proof spirit and Isotonic solutions based on Freezing Point and Molecular Weight.
- **Powders:** Definition, Classification, Advantages and Disadvantages, Simple and Compound Powders – Official Preparations, Dusting Powders, Effervescent, Efflorescent and Hygroscopic Powders, Eutectic Mixtures, Geometric Dilutions.
- **Liquid dosage forms:** Advantages and Disadvantages of Liquid Dosage Forms. Excipients used in Formulation of Liquid Dosage Forms. Solubility enhancement techniques.

## Unit III [08 Hours]

- **Monophasic liquids:** Definitions and Preparations of Gargles, Mouthwashes, Throat Paint, Eardrops, Nasal Drops, Enemas, Syrups, Elixirs, Liniments and Lotions.
- **Biphasic liquids:**
  - **Suspensions:** Definition, Advantages and Disadvantages, Classifications, Preparation of Suspensions; Flocculated and Deflocculated Suspension and Stability Problems and Methods to Overcome.
  - **Emulsions:** Definition, Classification, Emulsifying Agent, Test for the Identification of Type of Emulsion, Methods of preparation and Stability Problems and Methods to Overcome.

## Unit IV [08 Hours]

- **Suppositories:** Definition, Types, Advantages and Disadvantages, Types of Bases, Methods of Preparations, Displacement Value and its Calculations, Evaluation of Suppositories.
- **Pharmaceutical Incompatibilities:** Definition, Classification, Physical, Chemical and Therapeutic Incompatibilities with Examples.

## Unit V [07 Hours]

- **Semisolid Dosage Forms:** Definitions, Classification, Mechanisms and Factors Influencing Dermal Penetration of Drugs, Preparation of Ointments, Pastes, Creams and Gels, Excipients used in Semi Solid Dosage Forms, Evaluation of Semi Solid Dosages Forms



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## UNIT I

### Chapter 1 ...

# Historical Background and Development of Profession of Pharmacy

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## LEARNING OBJECTIVES

Pharmaceutics course is not only introductory for the Pharmaceutical Sciences but it is helpful to the students to explore the historical evolution, the potential and the perspectives of their scientific field.

The objectives of this chapter include:

- Recall the history of pharmacy, pharmaceutical practice, development of pharmacy profession and pharmaceutical industry in India.
- To acquaint the young pharmacy students with the official pharmaceutical literature, its importance and scope.
- To inform students about historical development of pharmacy education in India.
- To improve pharmacists participation in the organizational activities at various levels.
- To spread awareness among the students about career opportunities in the pharmaceutical field.
- To create awareness of latest advances and discoveries in the dosage forms.
- To know the history of profession of pharmacy

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### 1.1 HISTORY OF PHARMACY PROFESSION

The history of pharmacy profession can be traced back to third millennium BC in Samaria. Samarian people developed a cuneiform writing style on clay tablets which included lists of drugs of animal, vegetable and mineral origin that were used in the management of diseases, and prescriptions with details of the ingredients used in their compounding. Greeks were one of the first patrons of pharmacy profession. This profession can be traced back to the Sumerian population, living in modern day Iraq. Knowledge of preparation and application of natural products for healing is as old as man himself. Earliest known records of preparation of medicines are Babylonian 2600 BC. They called for combination of pharmaceutical, medical and religious measures. The *Ebers Papyrus* document dating back to 1550 BC describes prescriptions and modes of administration of drugs including gargles, inhalations, suppositories, ointments and lotions.

The Ancient Egyptians preparing specific medicine were known as *Pastophor*. Egyptians commonly used mortar and pestles, hand mills, sieves, balances for their compounding of suppositories, gargles, pills, inhalations, troches, lotions, ointments, plasters and enemas.

those who were involved in compounding and dispensing have called themselves chemists and/or druggists. The terms pharmacist and pharmaceutical chemist came later in the 1800s and shortened to chemist. By the mid of 19<sup>th</sup> century 'pure' scientific chemists had their own Chemical Society, formed in 1841.

In the 19<sup>th</sup> century pharmacy completely sprouted out from medicine and started developing as a separate profession. This century witnessed various milestones being set in the field of pharmacy. In 1821, first 'School of Pharmacy' was established in United States at Philadelphia. The first U. S. Pharmacopoeia was published in 1820. 'American Pharmacist Association' was founded in 1852. The first 'National Formulary' was published in 1888.

## **1.2 HISTORY OF PHARMACY PROFESSION IN INDIA**

Pharmacy is the health profession that links the health sciences with the chemical sciences that work to ensure safe and effective use of pharmaceutical drugs. Pharmacy practice includes traditional practice of compounding and dispensing of medications. History of pharmacy profession in India can be divided in to three parts as ancient history, pre-independence and post-independence.

### **Ancient Pharmacy Profession**

A little is known about history of ancient Indian pharmacy. In ancient India the sources of drugs were of vegetable, animal and mineral origin. They were prepared empirically by few experienced persons. Knowledge of that medical system was usually kept secret within a family. There were no scientific methods of standardization of drugs. In mythological literature it is reported that Lord Brahma was the first teacher of Universe who wrote "Ayurveda" in 5000 BC. Sushruta, the son of Vishwamitra, did his work in the field of surgery. The Ayurveda work on internal medicine whereas Sushruta-Samhita deals mainly with surgical medicine. Charaka and Sushruta were physicians as well as pharmacists who studied more than 1000 herbs. The Ayurveda had been used by his devotees for medical purposes. It eventually spread over Asia with the advanced evolution of Buddhism.

Archaeological evidence suggests the Indus people lived a settled life approximately in 2500 BC. The people in cities were enjoying the cleanest and hygienic daily life with elaborate civic sanitation systems. The whole conception shows a remarkable concern for health. The term Ayurveda (i.e., science of life) is found in Ramayana and Mahabharata and in the Atharva-Veda. The Aryans invaded India about 1500 BC and the Vedic age started. Vedic literature indicates that Lord Dhanvantari was worshiped as "God of Health". The reference of use of various herbs in treating diseases is mentioned in 'Rig-Veda'. The Rig-Veda texts contain the hymns for Soma and those for herbs. The concept of hospital was developed and practiced during rein of king "Ashoka The Great" in 226 BC.

In Tamil Nadu during 900 AD discovered organized practice of hospital activity for the treatment of patients with diseases. India, being rich in flora and fauna, wide variety of herb was mainly used to treat disease like piles, jaundice, dropsy, hemorrhage etc. During period of 15<sup>th</sup> century European practitioners were greatly influenced by Indian drugs and herbs. In 1563 Portuguese practitioner Garcia de Orta reported use of Indian herbs in his treatise "Coloquiosdos stroples a drogus da indica". British traders brought the practice of allopathic system to India in 15<sup>th</sup> century.

The first general hospital was setup at Madras in 1664. The first college in India was established at Madras in the name of Madras Medical College in 1835 where professional training was given to students for treating patients with drugs. Next year in 1836, Calcutta Medical College was started at Calcutta. The Indian system of medicine declined during the Muslim rule while the Arabic or the Unani-Tibbi system flourished. The Allopathic system came into India with the British traders who later become the rulers. Under British Rule Allopathic system got state patronage and become popular by the close of 19<sup>th</sup> Century. Allopathic system during last decades of British rule explored to the greatest level that it overruled traditional Indian system of medicine.

### **Pre-independence Pharmacy Profession**

The beginning of pharmacy profession can be traced back to 19<sup>th</sup> century when first chemist shop was opened by Scotch Bathgate at Calcutta in 1811. In India during independence various activities related to pharmacy practice were performed according to 'London Pharmacopoeia'. This situation forced back traditional practice in India and compelled to import drugs from European countries.

In 1840 Goa Medical College was started at Panjim. 'Bengal Dispensatory and Pharmacopoeia' was published in 1841 at Bishop's College Press Calcutta by order of Government. In 1868 'Pharmacopoeia of India' was published under editorship of Waring. The compilation of vernacular names of Indian medicinal plants and herbs was carried by Mohideen Sheriff in 1869. The inception of pharmacy profession in India was marked by the first class of the chemist and druggist conducted at the Madras Medical College in 1870s to train students to gain skills in pharmacy practice. The first of its kind two-year professional course 'Chemist and Druggist Diploma' was started in Madras Medical College in 1874. Pharmacy education pattern was based on the instructions provided by the Pharmaceutical Society of Great Britain.

In 1878, 'Opium Act' was implemented that dealt with cultivation of poppy and the manufacture, transport, export, import and sale of opium. A formal training of the compounders was started in 1881 in Bengal. The pharmacy profession entered India almost simultaneously. In 1889 'Indian Merchandise Act' was implemented to avoid misbranding of goods in general. In 1894 'Indian Tariff Act' passed for levy of customs duty on goods including foods, drinks, drugs, chemicals and medicines imported into India or exported there from. 'Sea Customs Act' in 1894 was enforced to prevent import of goods with false trade descriptions. In 1901 'City of Bombay District Municipal Act' that was concerned with food was passed.

Health Scenario in India during 1901-1930 was not good. The people were well under the poverty line and were undernourished. The systems of treatment for the prevalent diseases and ailment were the Ayurvedic and Unani systems of medicine and the Allopathic

In the same year British government bought 'Drug Bill' to regulate the import, manufacture, sale and distribution of drugs in British India. This Bill was finally adopted as 'Drugs Act of 1940'. This Act covered recommendations given by DEC headed by Chopra. Up to 1940 all the allopathic drugs were imported from Europe but in later years some of these drugs were begun to be produced in India.

In 1941 the first 'Drugs Technical Advisory Board' (DTAB) under this act was constituted. The first pharmacist post was created and filled at KEM hospital Mumbai. First 'All India Pharmaceutical Conference' (AIPC) was held at Banaras in January 1941 organized by IPA. Central Drugs Laboratory in Calcutta was established under Directorship of Col. Chopra on 1<sup>st</sup> February 1947 with four scientific divisions.

### 1.3 PHARMACEUTICAL EDUCATION

India was deprived of pharmacy education till start of 19<sup>th</sup> century. There was no recognized specialized education and only traditionally experienced professionals were involved in practice. Just after the publication of the report Pt. Madan Mohan Malaviya introduced 'Pharmaceutical Chemistry' subject in the three years' bachelor's degree course in science (B. Sc.). Mahadeo Lal Shroff 'The Father of Pharmacy Education in India' in 1937 started first B. Pharm. course at BHU. 'Indian Journal of Pharmacy' (IJP), first journal in India, was published 1939 as a quarterly journal devoted to the science and practice of pharmacy in all its branches. The first post-graduation course in pharmacy, M. Pharm., was introduced in 1940 at BHU.

In 1943, Indian Government appointed a committee under the chairmanship of Sir Joseph Bhore to make a survey of existing position in respect to the health care delivery organization in India and to make recommendation for future developments. This committee recommended three-tier system for education in pharmacy. In 1944, graduate course in pharmacy was started at the Punjab University, Lahore (currently in Pakistan). The B. Pharm. course at BHU was industry oriented while that at Punjab University was oriented towards Pharmacy practice. Though the profession was oriented towards pharmacy practice at the introductory stage but as it grew it became more industry oriented. In 1945 'Doctor of Philosophy' (Ph.D.) course was introduced at BHU. In the same year 'Drugs Rule' under the 'Drugs Act 1940' was established. In 1945, Government of India brought the Pharmacy Bill to standardize the Pharmacy Education in India. The 'Pharmacopoeial List' was published in 1946 under the chairmanship of Col. R. N. Chopra. Pharmacopoeial List contained lists of drugs in use in India at those times which were not included in British Pharmacopoeia. To regulate, control and standardize pharmacy education in India 'Pharmacy Bill' was passed by the Legislature in 1947.