CHAPTER 1

HISTORICAL BACKGROUND AND DEVELOPMENT OF PROFESSION OF PHARMACY

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Abstract

The profession of pharmacy has evolved significantly from its ancient roots to its current status as an integral part of modern healthcare. Early civilizations recognized the medicinal properties of plants, leading to the development of traditional healing practices. The emergence of apothecaries in medieval Europe marked a crucial step towards the formalization of pharmacy as a distinct profession. The Renaissance period saw advancements in chemical and botanical knowledge, contributing to the expansion of the pharmacist's role. The 18th and 19th centuries witnessed the isolation of active compounds from plants and the birth of synthetic drug manufacturing, revolutionizing pharmaceutical practice. The 20th century brought about significant changes, including the industrialization of drug production, the development of new dosage forms, and the expansion of clinical pharmacy services. Today, pharmacists play diverse roles in healthcare, from medication management to patient counseling and public health initiatives. The profession continues to adapt to technological advancements, evolving healthcare needs, and the increasing complexity of drug therapies, emphasizing the importance of lifelong learning and interprofessional collaboration in modern pharmacy practice.

Keywords: *Apothecary, Drug discovery, Professional evolution, Healthcare, Pharmaceutical science, Clinical pharmacy*

Learning Objectives

After completion of the chapter, the student should be able to:

- Understand the evolution of pharmacy as a profession from ancient times to the present day.
- Identify key milestones and influential figures in the history of pharmacy.
- Explain the transition from traditional apothecaries to modern pharmaceutical practices.
- Describe the development of pharmacology and its impact on the pharmacy profession.
- Discuss the role of pharmacy in healthcare systems throughout history.
- Analyze the changing responsibilities and scope of practice for pharmacists over time.
- Evaluate the impact of technological advancements on the pharmacy profession.

INTRODUCTION TO PHARMACEUTICS

Pharmaceutics: Pharmaceutics is a fundamental discipline within pharmacy that focuses on the transformation of new chemical entities (NCEs) or existing drugs into safe and effective medications for patient use. This field encompasses the science of dosage form design, which is crucial for optimizing drug delivery and therapeutic outcomes.

Drug

The term "drug" originates from the French word 'drogue', meaning herb, reflecting the historical roots of pharmacy in natural remedies. In modern pharmacology, a drug is defined as any agent used in the treatment, prevention, mitigation, cure, or diagnosis of diseases or

disorders in humans or animals. Drugs utilized in contemporary medical practice are either synthetic or derived from natural sources, including vegetable, animal, or mineral origins.

Drug sources have diversified significantly over time. While many pharmaceuticals still originate from natural sources, such as plants (e.g., morphine from Papaver somniferum), animals (e.g., heparin from porcine intestinal mucosa), or minerals (e.g., calcium carbonate), an increasing number are synthetic or semi-synthetic. Advances in medicinal chemistry and biotechnology have led to the development of novel drug entities and biologics, expanding the therapeutic arsenal available to healthcare professionals.

Dosage form

A dosage form is the final, administrable presentation of a drug, created by combining the active pharmaceutical ingredient (API) with non-drug components known as excipients or additives. Excipients encompass a wide range of substances, including binders, disintegrants, lubricants, preservatives, flavoring agents, and coloring agents. The selection and proportion of these ingredients are critical in determining the physicochemical properties, stability, and therapeutic efficacy of the final dosage form

The desirable properties of dosage forms are:

1. It should be convenient to handle, use and store. For better compliance it should not disturb his routine lifestyle as far as possible and should be acceptable aesthetically, organoleptically, therapeutically and from economic standpoint.

2. It should be stable during storage and use. During storage the physical, chemical and therapeutic integrity of the dosage form should be maintained by assuring freedom

from interaction between components, with packaging materials and environmental factors (heat, humidity, oxygen, light). It should also withstand mechanical shock during transportation. The dosage form should retain its shape, size, appearance, taste, flavor and therapeutic effect during the stipulated half life.

3. The dosage form should be represented in different dosage form strengths providing flexibility of dose to suit different age groups (50, 100,200mg etc)

4. It should provide anticipated therapeutic effect. The extent and pattern of drug release from the dosage form should be predictable.

5. It should protect the drug substance and conceal the disagreeable taste or odour.

6. It should be economical and presentation should be elegant.

7. Finally it should permit easy identification through distinct colour, shape or identification marking.

Classification of Dosage forms:

According to physical state: Solid, semi solid, liquid, gaseous.

Route of administration: Oral. Parenteral, rectal, nasal

Site of application: Skin, eye, tooth, hand, foot, hair, nose etc

Use: External, Internal

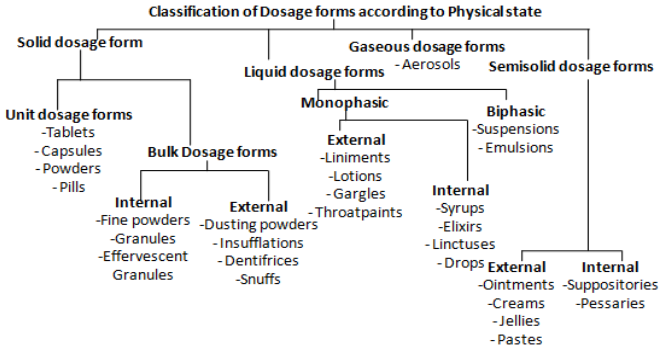


Figure: Classification of dosage forms according to physical state

Definitions

Tablets: Tablets are solid unit dosage forms containing one or more medicaments, with or without appropriate excipients. They are primarily manufactured through compression, although molding techniques may also be employed in some cases. While tablets are predominantly designed for oral administration, they can be formulated for other routes as well. The compression process involves the application of high pressure to a powder mixture, resulting in a coherent, uniform, and stable product. Tablets offer several advantages, including precise dosing, ease of administration, and improved stability compared to liquid formulations. They can be formulated to provide immediate release, modified release, or targeted delivery of the active ingredient(s). Common examples include Aminophylline tablets for bronchodilation, Chloroquine sulphate tablets for malaria treatment, and Paracetamol tablets for pain relief and fever reduction. The formulation of tablets typically includes the active pharmaceutical ingredient(s) (APIs), diluents (e.g., lactose, microcrystalline cellulose), binders (e.g., povidone, hydroxypropyl methylcellulose), disintegrants (e.g., croscarmellose sodium, sodium starch

glycolate), lubricants (e.g., magnesium stearate), and sometimes other functional excipients such as glidants or colorants

Capsules: Capsules are solid dosage forms in which the medicament is enclosed within a soluble container or shell, typically made of gelatin. This shell serves to mask the taste of the drug and facilitate swallowing. Capsules are classified into two main types: hard gelatin capsules and soft gelatin capsules.

Hard gelatin capsules consist of two parts - a body and a cap - and are primarily used for encapsulating solid or semi-solid formulations. They are filled with powders, granules, or pellets containing the active ingredient(s) and necessary excipients. Examples include Amoxicillin capsules for bacterial infections and Ampicillin capsules for various infectious diseases. Soft gelatin capsules, also known as softgels, are one-piece capsules that can encapsulate liquids, semi-solids, or solids. They are particularly useful for poorly water-soluble drugs or those that require protection from oxidation. Soft gelatin capsules are often used for vitamins, minerals, and some antibiotics.

Powders: Powders represent a versatile solid dosage form that can be used for both internal (oral) and external applications. Oral powders are designed for internal use and may be administered directly or reconstituted with water before ingestion. These can be simple (containing a single active ingredient) or compound (containing multiple active ingredients). Examples include Compound rhubarb powder, used as a laxative, and Compound sodium chloride and dextrose oral powder, used for oral rehydration therapy. Dusting powders, on the other hand, are intended for external use and are applied topically to the skin. They often contain ingredients like talc, zinc oxide, or starch and may be medicated or non-medicated. Talc

dusting powder is a common example, used to absorb moisture and reduce friction on the skin.

Pills: Pills are an antiquated solid dosage form that predates tablets in the evolution of unit dosage forms. They were developed to address the inconvenience associated with administering loose powders. Pills are spherical in shape, which was thought to facilitate swallowing. The manufacturing process typically involved mixing the medicinal powder with a suitable excipient to form a plastic mass, which was then rolled into a cylinder and divided into sections of equal weight. These sections were then rolled between the fingers to produce spherical pills.

While pills were once a popular dosage form, they have largely been supplanted by tablets and capsules in modern pharmaceutical practice. This is due to several factors, including:

- Difficulty in achieving content uniformity
- Lack of precision in dosing
- Challenges in large-scale manufacturing
- Potential for variability in disintegration and dissolution.

Granules: Granules are a solid dosage form of medicaments that serve as an intermediate product in tablet manufacturing or as a final dosage form for direct administration. The process of granulation involves mixing powdered drug(s) with excipients, including sweetening, flavoring, and coloring agents, to improve taste and appearance. A granulating agent, typically a liquid binder, is added to moisten the powder mixture and facilitate particle agglomeration.

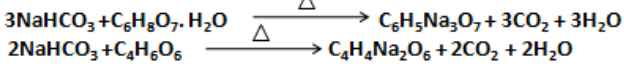
The wet mass is then passed through a sieve to create uniformly sized granules, which are subsequently dried at a controlled temperature, often around 60°C. This drying process is crucial to remove excess moisture and ensure stability. Granules are commonly supplied in glass

containers with instructions for the patient to reconstitute them with freshly boiled and cooled water, creating a liquid preparation at the time of use.

Granules offer several advantages:

- Improved flow properties compared to powders
- Enhanced content uniformity
- Reduced dust formation during handling
- Increased stability and shelf life
- Potential for controlled release formulations.

Effervescent Granules: Effervescent Granules are a specialized solid dosage form designed for internal use. They typically contain a combination of acids (such as citric acid and tartaric acid) and a carbonate or bicarbonate salt (usually sodium bicarbonate), along with the active medicament. A sweetening agent like saccharin or sucrose may be added to improve palatability



The effervescent reaction occurs when these granules are added to water. This reaction produces carbon dioxide gas, creating a pleasant, fizzy sensation and often enhancing the dissolution of the active ingredient. Effervescent granules are commonly used for:

- Antacid preparations
- Analgesics and antipyretics
- Vitamin and mineral supplements
- Oral rehydration therapies

The effervescence can mask unpleasant tastes, improve dissolution rates, and potentially enhance absorption of certain drugs. Patients are typically instructed to consume the preparation while effervescing or immediately afterward for optimal effect

Dusting powders: Dusting Powders are topical formulations intended for external application to the skin.