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Digitalis Review: A Complete Pharmacognostic & pharmacological overview.

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Abstract:

- History:** Digitalis is the plant that is the origin of Europe, Western Asia, and Northwestern Africa. Digitalis is one of the main herbal medicines which is used as remedies by the various ancient Romans. It is the best drug of choice and its use for the treatment of heart failure has been traced back to 10th century Europe, digitalis was not widely used for this indication until its scientific investigation by British physician William Withering in the late 1700s. For most of the 1800s, digitalis was used to treat a wide variety of diseases and disorders. In 1875, German chemist Oswald Schmiedeberg first isolated pure digitoxin from digitalis, leading others to extract and identify other glycosides from various species of digitalis. In 1957, digoxin was isolated from Digitalis. lanata and is now a major cardiac glycoside marketed in tablet form. Digitalis was admitted into the first edition of the Pharmacopeia of the United States (1820) and is currently recognized by all major pharmacopeia. In South America, preparations of the powdered leaves are used to relieve asthma, as sedatives, and as diuretic/cardiotoxic. In India, an ointment containing digitalis glycosides is used to treat wounds and burns. Belcastro 2002, Feussner 2010, Morton 1997.
- Origin:** Digitalis is the drug classified under the class of cardiac Glycoside. This drug is approved by the FDA in the year of 1954. They coined Digitalis as a foxglove plant known as the digitalis plant. The whole study of Digitalis is done by the scientist William Withering, he is an English Physician and Botanist in the years from the 1780s.
- Keywords:** *Digitalis, Heart Disease, Digitoxins, Cardiac Glycoside, foxglove, Cardiotonic.*
- Cardiac Glycosides:** These are an important class of naturally occurring drugs. The action of this drug includes both beneficial and toxic effects on the heart. Cardio-active Glycosides are the group of steroidal glycosides are act as cardiotoxic agents with various properties such as are amorphous, powder form, soluble in water, having a bitter taste, and insoluble in an organic compound, they are very toxic compounds when consumed in the large dose and they are odorless. Stability as acid hydrolysis, enzymatic hydrolysis.

Digitalis

1. Scientific Name(s): *Digitalis lanata* Leaves - White Flowers
Digitalis purpurea L. – Foxglove
2. Common Name(s): Ladies Glove, Dead man's bells, Witch's bells, Woolly foxglove, Lady's thimble, Lion's mouth, purple foxglove *digitalis eriostachya* Besser ex Rchb.,
3. Index Terms: *Digitalis ambigua*, *Digitalis ferruginea*, *Digitalis grandiflora*, *Digitalis lutea*.
4. Family: Scrophulariaceae.



Taxonomical Classification:

Genus: *Digitalis*; **Species:** *Digitalis Lanata*; *Digitalis Purpuria*; **Kingdom:** Plantae; **Subkingdom:** viridiplantae; **Infrakingdom:** streptophyte; **Division:** Tracheophyta; **Subdivision:** spermatophyte; **Superdivision:** Embryophyta; **Order:** Lamiales;/

Morphology:

Digitalis purpurea is an herbaceous biennial or also called a short-lived perennial plant. The leaves of digitalis are spirally arranged, simple, 15–35 cm (4.0–13.8 in) long and 5–15 cm (2–5 in) broad, and are covered with grey-white pubescent and glandular hairs, also they have imparted a woolly texture. *Digitalis purpurea* is a native European foxglove woodland plant with spikes of tubular purple flowers with a spotted throat. *Digitalis lanata* is an erect perennial forming a rosette of evergreen lance-shaped leaves, with cream or pale-yellow flowers 2.5cm long, veined with brown, in a long spike in summer.

Macroscopic Characteristic:

1. Colour - Green, Dark Greyish-green
2. Odour - Slight
3. Taste - Bitter
4. Size - 10-40 cm long & 4-20 cm wide
5. Shape - Ovate-Lanceolate to broadly ovate; with irregularly crenate or serrate or occasionally dentate margin.

Microscopic Characteristics:

Dorsiventral Leaf; Amniocytic Stomata; uniseriate stomata; Multicellular(3-5 cells); Bluntly Points; Glandular Trichomes; Collapsed celled covering trichomes; Free from Calcium Oxalate and sclerenchyma; Starch grain; collenchyma;

Traditional use:

Digitalis is used to treat heart rhythm problems (atrial arrhythmias) and also treat congestive heart failure (CHF). *Digitalis* also increases blood flow throughout your body and reduces swelling in your hands and ankles. Earlier *Digitalis* is used for the treatment of peptic ulcers, headaches, boils, and paralysis. Externally, *digitalis* species were used for the granulation of poorly healing wounds and to cure ulcers. After William Withering's work, the digoxin is isolated from the *digitalis* species as a life-saving cardiac drug.

Chemical Constituents:

0.2-0.45% of primary and secondary glycosides, digitoxin, gitoxin, glucogitaloxin, genotoxin, cardiac glycosides, digitoxin, digoxin, ouabain, oleandrin and procellariid, volatile oil, fatty matter, starch, gum and sugars, glucodigifucoside, diacetyl lanatoside C and digoxin]; [Aglycone diginatigenin: lanatoside D, diginatin, diginatigenin gitaloside]; [Aglycone gitaloxigenin: lanatoside E, glucoverodoxin (0.01 to 0.14%), glucoverodoxin (0.02 to 0.12%) and gitaloxin]; [Pregnane derivatives: including digifolein, glucodigifolein, diginin, digipronin, lanafrolein, and gitonine]; [Steroid saponins: including lanagitosides I and II, lignin, desglucolanatigonin, aglycones including tigogenin, digoxigenin, digitogenin, and gitogenin] [43]. Phenylethyl glycosides, verodoxin.

Test for Digitalis:

1. **Killer-kiliani Test for Digitoxose:**
2. **Legal Test:**
3. **Baljet Test:**

Use:**Cardiovascular effects**

Cardiac glycosides possess positive inotropic effects due to inhibition of sodium-potassium adenosine triphosphatase, which allows calcium to accumulate in myocytes leading to enhanced cardiac contractility. These drugs also possess some antiarrhythmic activity but will induce arrhythmias at higher dose levels.

Clinical data

Digitalis glycosides have been used clinically for the treatment of heart failure for more than 200 years and remain the source of commercial digoxin preparations; however, a defined place in therapy remains under debate. Reviews of the large, multicentre Digitalis Investigation Group trial and other clinical trials have found no clear effect of digitalis on mortality in heart failure. Some effect has been demonstrated for secondary outcomes of decreased hospitalizations and clinical (symptomatic) deterioration.

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Contraindications:

Do not allow children to come into contact with the potentially lethal plant.

Pregnancy/Lactation:

Documented adverse cardiac reactions. Avoid use.

Interactions:

There are numerous interactions with digoxin and digitalis glycosides, ranging from relatively minor (cimetidine, triamterene) to life-threatening (amiodarone, furosemide, verapamil).

Adverse Reactions:

Adverse reactions are generally related to toxicity.

Toxicology:

All parts of the plant are toxic. The incidence of digitalis toxicity in therapeutic use has been estimated to range from 5% to 25%. Ingestion of extremely small amounts of the plant may be fatal to humans, especially children, and to animals. Toxicity is cumulative.

Conclusion: According to all the aspects of this topic, we concluded that the digitalis is a pharmacokinetically useful drug of choice for modern and traditional use. It is a costly drug but useful in anticancer therapy in a broad manner. We conclude that this review gives you better information for your next studies and also for research and review.

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