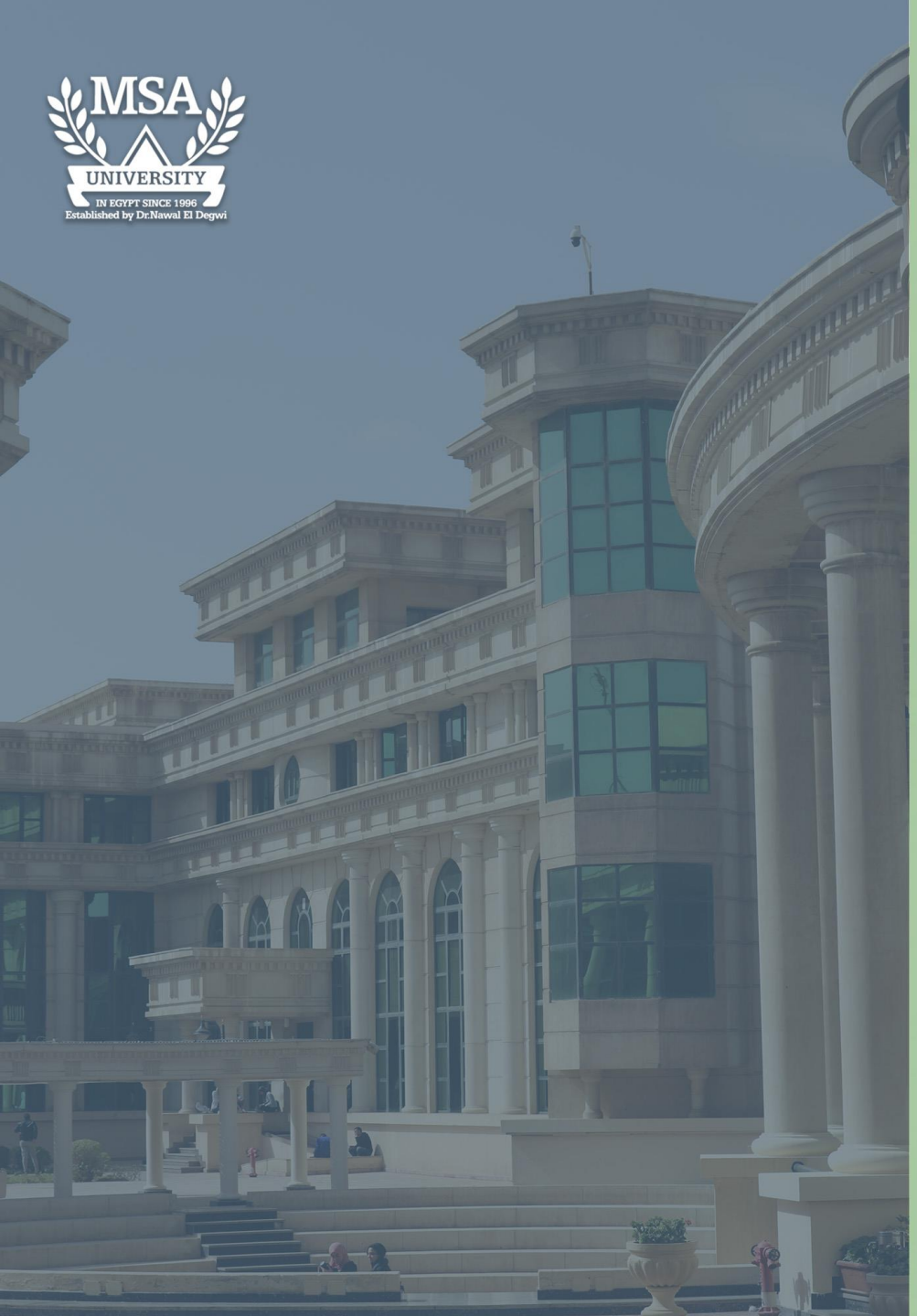

MSA
UNIVERSITY
IN EGYPT SINCE 1996
Established by Dr.Nawal El Degwi
MSA UNIVERSITY
جامعة أكتوبر للعلوم الحديثة والآداب

Pharmacognosy
PHG112



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Lecture 3

Examples of seeds

Interactive teaching methods and activities

Learning Outcomes

By the end of this lecture, students should be able to:

1. Knowledge / Remembering

- Identify the botanical sources of nutraceutical seeds (chia, quinoa, nigella, pumpkin) and cosmeceutical seeds (jojoba, castor, evening primrose).
- List the major active constituents of each seed
- Recognize the pharmaceutical and therapeutic uses of seeds such as colchicum and calabar bean.
- Recall important toxic constituents such as ricin in castor seeds and colchicine in colchicum.

2. Comprehension / Understanding

- Explain the health benefits of omega-3 fatty acids in chia and nigella seeds.
- Describe how dietary fibers in chia and quinoa contribute to obesity and diabetes management.
- Discuss the mechanism of action of physostigmine from calabar beans.
- Summarize the cosmeceutical benefits of jojoba oil and castor oil for hair and skin.

Learning Outcomes

By the end of this lecture, students should be able to:

3. Application

- Relate the chemical composition of each seed to its therapeutic or cosmetic use.
- Apply knowledge of seed constituents to suggest suitable seeds for managing hyperlipidemia, diabetes, or inflammation.
- Demonstrate awareness of safety precautions when recommending seeds with potential toxicity (e.g., castor seeds, colchicum).

4. Analysis

- Differentiate between nutraceutical and cosmeceutical applications of seeds.
- Compare the mechanisms of action of cardiac, hypoglycemic, and anti-inflammatory seeds.
- Analyze the risk-benefit profile of seeds containing potent bioactive compounds (e.g., ricin, colchicine).

Learning Outcomes

By the end of this lecture, students should be able to:

5. Synthesis / Creating

- Construct a comparative table summarizing origin, active constituents, uses, and side effects of the seeds discussed.
- Propose a simple nutraceutical formulation for metabolic syndrome using selected seeds.

6. Evaluation

- Evaluate the role of nutraceutical seeds in disease prevention versus conventional pharmacotherapy.
- Assess the safety considerations of long-term use of omega-3 rich seeds.
- Judge the therapeutic value of seed-derived products in modern pharmacy practice.

Seeds having Nutraceutical Applications

Chia seeds

Chia seeds are the edible seeds of *Salvia hispanica* a flowering plant in the mint family (Lamiaceae)

Chemical constituents:

- Dietary fibres
- Protein
- High amount of omega-3 fatty acids
- Vitamins (A , B1& B3)
- Minerals; calcium, iron, magnesium, phosphorous

Uses:
-Treatment of obesity
-Diabetes
-Hypertension
-Reducing cholesterol

Side effects:
-When it is consumed in lots of quantities the body may find it difficult to digest it properly. One should stick to an ideal quantity of chia seeds in a day and not consume more. Consuming more of these tiny seeds can cause **diarrhea**, **bloating** and **stomach cramps**

-It is known that high levels of omega-3 fatty acids may increase the **risk of bleeding**. Therefore, it is advised to avoid taking chia seeds with foods or supplements rich in omega-3 fatty acids

Quinoa seeds

The seeds of ***Chenopodium quinoa*** Family Chenopodiaceae
It is a flowering plant grown as a crop primarily for its edible seeds

Chemical constituents:
1-One of the best vegetable sources of protein. Eessential amino acids such as lysine and methionine.
2- Large quantities of vitamins (thiamin,vitamin C) and minerals
3- High content of fibre, carotenoids
4-Terpenoids, flavonoids, phenolic acids, and steroids.

Uses:
Treatment of Obesity – Diabetes - Celiac disease - Antioxidant

Name	Origin	Active constituents	Uses
1-Nigella seed 	**The dried ripe seeds of *Nigella sativa* F. Ranunculaceae**	**Volatile oil (1.4 %) Thymoquinone, Carvone , Fixed oil *Unsaturated fatty acids [Oleic acid , Linoleic acid Δ3 , Linolenic acid Δ6 , Stearic acid] *Saturated fatty acids [Myristic acid , Palmitic acid]. Protein ,Vitamins (B 1,2,6), Minerals (Ca , Fe , Zn , Cu)**	**1-Treatment of respiratory tract conditions (Allergy , cough, colds , bronchitis , Flu , asthma) 2- Support circulatory and immune system 3- Decrease the probability of arteriosclerosis and prevents thrombosis, due to the presence of unsaturated fatty acids**
2-Pumpkin seed 	**The dried ripe seeds of *Cucurbita pepo* , F. Cucurbitaceae**	**-Sterols (e.g. β-sitosterol, β-tocopherols) - Triterpenes (squalene), tetraterpene (β-carotene) - Unsaturated fatty acids (omega 6 & omega 3)**	**Antiinflammatory, antiviral, analgesic in urinary disorders, anti-ulcer, antidiabetic and antioxidant**  

Seeds having Cosmeceutical Applications

Jojoba seeds

Jojoba oil is extracted from the seeds of the Jojoba plant (*Simmondsia chinensis)*

Jojoba oil is rich in vitamins B, E, and C and minerals like copper and zinc

Benefits Of Using Jojoba Oil For Hair

1.Moisturises Hair

2. Promotes Hair Growth & Thickness

3. Repairs Damage From Heat & Styling Tools

4. Maintains Scalp’s Natural Balance

5. Controls Dandruff

How To Use Jojoba Oil For Hair?

1. Direct Application

2. Mixing it With Other Products

4. Use it as a Hair Mask Ingredient

Castor seeds

The dried ripe seeds of *Ricinus communis*, F. Euphorbiaceae.

Active constituents:

1- Alkaloids: Ricinine
2- Ricin (a lectin that inhibits protein synthesis in animal cells and leads to cell death).
3- Fixed oil and protein.

Uses:

1- The oil is a powerful purgative (the seeds are toxic).
2- Externally, the oil has been recommended for tinea, forms a light coloured odourless soap or in the form of pastes.
3-Castor oil provides hydration and conditions the hair since it's rich in ricinoleic acid and fatty acids, which serve as natural emollients for the hair.

Side effects and toxicity:
The plant including the seeds contains an irritant substance named Ricin that poisons the blood.
N.B: One of the most potent natural toxins known. One seed can kill a child
The oil is safe because the poison remains in the seed where seeds themselves and the cake left after the expression of the oil are violently purgative.

N. B. Applying castor oil just once a month can boost hair growth up to five times the usual rate. It can moisturize a dry, irritated scalp. Castor oil's antibacterial and antifungal properties can reduce dandruff. It can help grow hair in other parts of the body, like the eyebrows and eyelashes

Other Common Seeds

Some Common Seeds

Name	Origin	Active constituents	Uses
1-Colchicum  	Dried ripe seeds of *Colchicum autumnale* family Liliaceae	1- 0.2 0.8% of alkaloid colchicine 2- 1% of fixed oil 3- 5% glucose	1-It relieves the pain and inflammation of acute gout 2- Plant hormone, it induces polyploidy 3- Cytotoxic effect
2-Calabar beans	The dried ripe seeds of *Physostigma venenosum* F. Leguminosae	Alkaloids (physostigmine also known as eserine)	- Contract the pupil, manage ocular pressure in glaucoma, - Reverse the toxicity of certain other drugs - Semi synthesis of rivastigmine used to treat dementia in Alzheimer disease

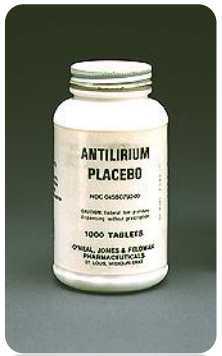
Calabar beans

Pharmaceutical preparations containing physostigmine (eserine)

Bi-miotic

Anticholium

Antilirium



Name	Origin	Active constituents	uses
3-Evening primrose 	Dried ripe seeds of *Oenothera biennis* F. Onagraceae	Protein(essential - amino acids, containing sulphur) Fixed oil (- gamma-linolenic acid (GLA) Cellulose -	-EPO is used for skin disorders such as eczema, psoriasis, and acne - It is also used for rheumatoid arthritis, weak bones - High cholesterol & heart disease

Evening primrose oil is a source of phytoestrogens, or compounds that mimic the effects of estrogen in the body. It is often used to help balance hormones, particularly in women.
It can be beneficial for symptoms related to hormonal imbalances (low estrogen), such as Premenstrual Syndrome (PMS) and menopausal symptoms. The GLA in primrose oil helps regulate hormone levels in the body.

Side effect: Causes blood thinning which may lead to bleeding

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