

# **PHYTOTHERAPY**

## **Chapter 3**

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# Gastrointestinal system

- The treatment of different diseases of the **digestive tract** and alleviation of the related symptoms is a very wide area and has the **longest tradition in phytotherapy**.
- The **spices** not only provide a pleasant taste for dishes but also possess medicinal properties: they increase the **appetite**, **relieve gastrointestinal spasms**, etc.

# Gastrointestinal system

## «*Functional gastrointestinal disturbances*»

- Functional gastrointestinal disorders can be categorized as **functional dyspepsia** or **functional bowel disorders**.
- The recommended medicinal plants range from **bitters** to **cholagogues** and **spasmolytics**.
- In functional dyspepsia, epigastric pain, epigastric burning, early satiation may be occurred.

# Gastrointestinal system

## «*Functional gastrointestinal disturbances*»

- In these patients, **insufficient bile**, **pancreatic or gastric juice** may be detected, but these, together with gastric *Helicobacter pylori* infection, accompany rather than cause the syndrome.

# Gastrointestinal system

## «*Functional gastrointestinal disturbances*»

- Plants help to **improve the digestion** (by increasing the appetite, or gastric juice or bile production), **protecting the gastric mucosa** and **relieving gastrointestinal spasms**.
- Functional bowel disorders are grouped as **irritable bowel syndrome**, **functional bloating**, **unspecified functional bowel disorder**, **functional diarrhea** or **functional constipation**, depending on the leading symptoms.

# Gastrointestinal system

## «Functional gastrointestinal disturbances»

### Carminatives

- **Bloating**, a feeling of fullness and flatulence are common symptoms in functional dyspepsia and functional bowel disorders.
- The causes of bloating may range from insufficient biliary and pancreatic secretion to gastrointestinal inflammatory states.
- Overeating or consumption of the foods containing digestive enzyme-blocking components also results in bloating.
- The direct cause of the symptoms is excessive gas formation, which may result in gastrointestinal discomfort for the patient.

# Gastrointestinal system

«*Functional gastrointestinal disturbances*»

## *Carminatives*

- In the treatment of bloating, **spasmolytics** are usually applied as synthetic medicines.
- As concerns phytotherapeutics, the first-choice drugs contain **carminatives** (*in Latin: cleanse*).
- They **promote digestion** by enhancing the appetite and **increasing the production of digestive juices**.
- Carminative plants contain **essential oil** and their oils, and alcoholic and water extracts used for the treatment.

# Caraway

«*Carum carvi*»

**Used part:** whole fruit and its essential oil

**Used type:** essential oil or powder

**Drog properties:** very odorous



# Caraway

«*Carum carvi*»

## Chemical composition and mechanism of action:

Essential oil ..... monoterpenes «**carvone** and **limonene.**»

It contains **fixed oil**, **protein**, **carbohydrates** and in lower quantities **phenolic acids** «**caffeic acid**»

«**The enantiomer S-(+)-carvone is present in caraway, whereas R-(-)-carvone is a constituent of **spearmint oil.**»**

# Caraway

## «*Carum carvi*»

### Chemical composition and mechanism of action:

- Alcoholic caraway fruit extracts and essential oil were shown **spasmolytic effect** (*in vivo*).
- **Antimicrobial activity** has been reported for ethanolic extracts and the essential oil.
- An aqueous caraway fruit extract and the essential oil have been shown to **decrease the blood glucose and plasma lipid levels** in animal experiments.
- There have been reports on studies of the effects on **intestinal smooth muscle** cells (*in vivo*).

# Caraway

## «*Carum carvi*»

### Efficacy and indications:

- ❖ The 50 mg essential oil dose reduced the contraction amplitude in the duodenum and reduced the contraction amplitude and the duration of contractions in the gastric corpus during certain phases of the migrating motor complex.
- ❖ EMA monograph indicates that caraway-containing products (including caraway essential oil) may be applied for the; **symptomatic relief of digestive disorders such as bloating and flatulence.**

# Caraway

## «*Carum carvi*»

### Efficacy and indications:

- ❖ According to the EMA monograph, **0.5-2 g** of the herbal substance or comminuted herbal substance should be extracted with **150 ml of boiling water** as a herbal infusion **1-3 times daily**. In the case of the essential oil, **0.15-0.3 ml** divided into up to **3 doses should be used daily**.
- ❖ Essential oil-containing (2%) semi-solid preparations can be used cutaneously on the abdominal area for the same purpose.

# Caraway

## «*Carum carvi*»

### Side effects, interactions & contraindications:

- **Contraindications are limited** to hypersensitivity to the active substance, to other plants of the Apiaceae (Umbelliferae) family (fennel, anise, celery, coriander and dill), to mugwort or to birch.
- Administration to patients with liver disease, cholangitis, achlorhydria, gallstones or any other biliary disorder is not recommended.
- Safety during pregnancy and lactation has not been established.

# Fennel

«*Foeniculum vulgare*»

**Used part:** crushed fruit

**Used type:** a tea or solid or  
liquid extracts

**Drog properties:** odorous,  
sweet or bitter varieties



# Fennel

«*Foeniculum vulgare*»

**Chemical composition and mechanism of action:**

**Essential oil** ..... monoterpenes «**trans-anethole, fenchone, estragole**»

**Sweet fennel** contain more **trans-anethol** and less **fenchone** than bitter fennel.

It contains **water-soluble glycosides of monoterpenoids, aromatic compounds, proteins, fixed oil, phytosterols** and **traces of furanocoumarins.**

# Fennel

«*Foeniculum vulgare*»

## Chemical composition and mechanism of action:

- Fennel essential oil shown the **spasmolytic, secretolytic and antibacterial activity**.
- Alcoholic fennel fruit extracts and the essential oil have **relaxing effect on smooth muscles**.
- Aqueous extracts **increased gastric acid secretion** in rats.

# Fennel

## «*Foeniculum vulgare*»

### Chemical composition and mechanism of action:

- **Mucociliary transport was increased** after the administration of aqueous fennel extract.
- **Fenchone** (but not anethole) had a **secretolytic effect** by inhalation.
- Fennel fruit extracts and oil exhibited in vitro **inhibitory activities against the growth of a wide spectrum of pathogenic bacteria and fungi**.
- Fennel essential oil exerted a **hypoglycemic effect** in mices.
- Oral administration of fennel extracts to male and female rats caused **dose-dependent estrogenic effects**.
- In vitro and in vivo studies revealed the estrogenic activity of trans-anethole.

# Fennel

«*Foeniculum vulgare*»

## Efficacy and indications:

- In adults, **no studies** have been carried out to confirm the **efficacy in gastrointestinal disorders**.
- In children, there is some clinical evidence of the efficacy.
- Oral administration of a 0.1% fennel seed oil emulsion was significantly **decreased the intensity of infantile colic**.

# Fennel

«*Foeniculum vulgare*»

## Efficacy and indications:

- The efficacy of fennel essential oil against **primary dysmenorrhea** was demonstrated in terms of **pain reduction**.
- The traditional use of the plant indicates that bitter fennel may be applied;
  - ✓ for the symptomatic treatment of mild, spasmodic gastrointestinal complaints including bloating and flatulence
  - ✓ for the symptomatic treatment of the minor spasms associated with menstrual periods and
  - ✓ as an expectorant in cough associated with a cold.

# Fennel

«*Foeniculum vulgare*»

## Dosage:

- The daily dose is **3 x 1.5-2.5 g freshly** comminuted fruits as tea.
- The essential oil of bitter fennel is indicated as an expectorant in the cough associated with a cold. The **daily dose is 0.2 ml.**

# Fennel

«*Foeniculum vulgare*»

## Side-effects, interactions & contraindications:

- Fennel oil extracts were found to be **mutagenic** *in vitro*.
- Several studies have shown the **carcinogenic effects of estragole** in mice.
- EMA does not recommend the application of fennel for **young children, pregnant and breastfeeding women** .
- Fennel oil is contraindicated for **pregnant and breastfeeding women** and those **under 18**.
- **The oil should not be taken for more than two weeks.**

# Anise

«*Pimpinella anisum*»

**Used part:** fruit

**Used type:** a tea or essential  
oil

**Drog properties:** specific  
odour



# Anise

«*Pimpinella anisum*»

## Chemical composition and mechanism of action:

Essential oil ..... monoterpenes «**trans-anethole**»

It contain **flavonol glycosides**, **phenolic acids**, **proteins** and **fatty oil**.

It contains **furocoumarins** in traces (mainly **bergaptene**) and **hydroxycoumarins** (mainly **umbelliferone**).

# Anise

«*Pimpinella anisum*»

## Chemical composition and mechanism of action:

- The medicinal use of aniseed is based on the preclinically confirmed **antispasmodic**, **secretolytic** and **antibacterial** effects of its essential oil.
- Anise oil and different extracts exhibited *in vitro* **inhibitory activities against a wide spectrum of pathogenic bacteria and fungi.**
- The main component of the essential oil, trans-anethole, demonstrated **estrogenic effects** in animal experiments.

# Anise

## «*Pimpinella anisum*»

### Efficacy and indications:

- The medicinal use of anise **is not supported by clinical evidence.**
- **Clinical trials have been carried out with combination products containing anise to confirm expectorant, antiasthmatic and laxative effects.**
- On the basis of its use in traditional medicine, aniseed and anise essential oil can be marketed as traditional herbal medicinal products;
  - for the symptomatic treatment of mild, spasmodic gastrointestinal complaints and
  - as an expectorant in the cough associated with a cold.
- It can be applied as a tea, with a **single dose of 1-3.5 g of the whole or freshly comminuted aniseed.** The dose of **anise oil is 3 x 0.05-0.2 ml.**

# Anise

«*Pimpinella anisum*»

## Side-effects, interactions & contraindications:

- The contraindications include **hypersensitivity** to the active substance or to Apiaceae (caraway, celery, coriander, dill and fennel) or to anethole.
- Its safety during pregnancy and lactation and in children under 12 has not been established.
- Anethole was found to be **weakly mutagenic**.
- Anise is widely used without any signs of danger.

# Yarrow

«*Alchemillea millefolium*»

**Used part:** herba

**Used type:** a tea or extract

**Drog properties:** specific

odour



# Yarrow

«*Alchemillea millefolium*»

**Chemical composition and mechanism of action:**

**Tannins and Essential oil**

**Guaianolide-type sesquiterpene lactones «achillicin, achillin» Flavonoids..... «apigenin, luteolin»**

**Phenolic constituents**

# Yarrow

## «*Alchemillea millefolium*»

### Chemical composition and mechanism of action:

- A water extract inhibited the activities of different **proteases and lipoxxygenase**, and the biosynthesis of prostaglandin.
- **Analgesic and anti-inflammatory effects** of the water and alcoholic extracts have been confirmed in in vivo studies.
- Flavonoid-rich and alcoholic extracts displayed **spasmolytic activity**.
- An extract rich in dicaffeoylquinic acids (these are water-soluble) significantly **increased the bile flow**, due to its **choleretic effect**.
- Yarrow had a **gastroprotective effect** in animal experiments.

# Yarrow

«*Alchemillea millefolium*»

## Chemical composition and mechanism of action:

- Yarrow extract has **exhibited antioxidant activities** in several assays.
- Different extracts exerted in vitro **antiproliferative effect** on cancer cell lines.
- Yarrow was found to be have an **estrogenic effect**
- Various extracts of the plant were active against a series of **pathogenic microorganisms** in vitro.

# Yarrow

«*Alchemillea millefolium*»

## Efficacy and indications:

- Its **spasmolytic activity** is related to its efficacy in minor spasms associated with the **menstrual periods**.
- The **antiphlogistic and antimicrobial effects** of yarrow are useful for topical application.

# Yarrow

## «*Alchemillea millefolium*»

### Efficacy and indications:

- Yarrow may be used as a traditional herbal medicinal product for
  - a temporary **loss of appetite**,
  - the **symptomatic treatment of mild, spasmodic gastrointestinal complaints**,
  - the **symptomatic treatment of minor spasms associated with menstrual periods**, and
  - the **treatment of small superficial wounds**.
- For these purposes, a **herbal tea** (prepared from **2-4 g of dried herb 3-4 times daily** or from **2 x 1.5-2 g of the flowers**) or different liquid extracts may be applied. To improve the appetite, tea is consumed **30 minutes before meals**.

# Yarrow

«*Alchemillea millefolium*»

## Side-effects, interactions & contraindications:

- **Contact allergy** is more common.
- **Large doses are contraindicated in pregnancy**
- **Although its safety during pregnancy and lactation and in children has not been established.**

# Roman camomile

«*Chamaemelum nobile* (Syn. *Anthemis nobilis*)»

**Used part:** flowers

**Used type:** a tea or extract

**Drog properties:** blue

colored essential oil



# Roman camomile

«*Chamaemelum nobile* (Syn. *Anthemis nobilis*)»

## Chemical composition and mechanism of action:

Essential oil.. monoterpenes «alpha- and beta-pinen, beta-myrcene, limonene, gamma-terpinene»

sesquiterpenes «alpha- and beta-caryophyllene, chamazulene, bisabolane and bisabolene»

Low molecular weight esters... «isobutyl angelate, isoamyl isobutyrate, 2-methylbutyl angelate and isoamyl tiglate»

Sesquiterpene lactones... «nobilin and derivatives»

Flavonoids and polysaccharides

# Roman camomile

«*Chamaemelum nobile* (Syn. *Anthemis nobilis*)»

## Chemical composition and mechanism of action:

- The **anti-inflammatory and antiedema effects** of the polysaccharides have been confirmed in animal experiments.
- **Antioxidant and antimicrobial activities** have been demonstrated in vitro.
- The **spasmolytic effect** has not been studied.
- Active compounds are azulens.

# Roman camomile

«*Chamaemelum nobile* (Syn. *Anthemis nobilis*)»

## Efficacy and indications:

- The efficacy has not been confirmed by human studies.
- The plant may be used as a traditional herbal medicinal product for the treatment of
  - mild, spasmodic gastrointestinal complaints, including bloating and flatulence.
- The posology is **1-4 g of the herbal substance as a herbal infusion 3 times daily** between meals (or liquid extracts with a similar dosage).
- Interestingly, the external application of Roman camomile is not accepted by the EMA

# Roman camomile

«*Chamaemelum nobile* (Syn. *Anthemis nobilis*)»

## Side-effects, interactions & contraindications:

- The only contraindication is **hypersensitivity** to the active substance and to other plants of the Asteraceae family.

# Cinnamon

«*Cinnamomum cassia, Cinnamomum zeylanicum* »

**Used part:** bark

**Used type:** powder

**Drog properties:** special

odour



# Cinnamon

«*Cinnamomum cassia, Cinnamomum zeylanicum*»

**Chemical composition and mechanism of action:**

**Essential oil..** «**cinnamaldehyde, eugenol and cinnamyl acetate**»

**Oligopolymeric procyanidins, cinnamic acid, polysaccharides and coumarins**

# Cinnamon

«*Cinnamomum cassia, Cinnamomum zeylanicum*»

## Chemical composition and mechanism of action:

- The efficacy of cinnamon oil was confirmed for **flatulence**.
- **Papaverine-like spasmolytic effects** of cinnamon oil and cinnamaldehyde on isolated smooth muscles have been observed.
- Cinnamaldehyde is an **inhibitor of stomach peristalsis and also stimulates bile secretion** in vivo.
- The oil (and its constituent eugenol) exerted **anti-inflammatory activity** by blocking the enzyme cyclo-oxygenase.
- Cinnamon oil has pronounced **antimicrobial activities** (on both bacteria and fungi).

# Cinnamon

«*Cinnamomum cassia, Cinnamomum zeylanicum*»

## Efficacy and indications:

- The most widespread contemporary use of cinnamon is the application as **antidiabetic** treatment. For this purpose, food supplements are used. There is no medicinal product with this indication on the market.

# Cinnamon

«*Cinnamomum cassia, Cinnamomum zeylanicum*»

## Efficacy and indications:

- Although there have been numerous studies indicating **blood glucose level-lowering effect**.
- In a clinical study on patients with **type 2 diabetes**, treatment with capsules containing ***C. cassia* 1.3 or 6 g daily for 40 days**, complementing the antidiabetic medication, significant reductions of fasting serum glucose (20-30%), triglyceride (20-30%) and LDL cholesterol (7-27%) levels were observed relative to the placebo group.

# Cinnamon

«*Cinnamomum cassia, Cinnamomum zeylanicum*»

## Efficacy and indications:

- European Medicines Agency approved cinnamon as a traditional herbal medicinal product for
  - ✓ symptomatic **treatment of mild, spasmodic gastrointestinal complaints**, including **bloating and flatulence**, or
  - ✓ symptomatic **treatment of mild diarrhea**.
- The dose as a tea is 0.5-1 g of comminuted herbal substance as an infusion, up to 4 times daily.
- The dosage of the liquid extract and tinctures is about 2-4 ml daily.

# Cinnamon

«*Cinnamomum cassia, Cinnamomum zeylanicum*»

## Side-effects, interactions & contraindications:

- **Cinnamaldehyde** is an irritating and sensitizing component that may be the cause of dermatitis, but such an adverse reaction does not develop following oral application.
- The **oil may cause local irritation** of the oral mucosa.
- The usage of cinnamon during pregnancy and lactation is not recommended.

# Peppermint

«*Mentha x piperita*»

**Used part:** herba

**Used type:** plant or essential oil

**Drog properties:** It is a hybrid of spearmint (*M. spicata*) and water mint (*M. aquatica*). It has menthol odour.



# Peppermint

«*Mentha x piperita*»

**Chemical composition and mechanism of action:**

**Essential oil..** «**menthol and menthone**»

**Flavonoids...** «**eriocitrin**»

**Phenolic acids**

# Peppermint

## «*Mentha x piperita*»

### Chemical composition and mechanism of action:

- Leaf extracts, peppermint oil and menthol exert antispasmodic effects.
- This activity could be reproduced with the flavonoid fraction of the leaf extract, but the flavonoid-free essential oil was also effective.
- Peppermint reduces the tone of the esophageal sphincter.
- Peppermint oil inhibits potential-dependent Ca<sup>2+</sup> currents, with a similar effect to those of Ca<sup>2+</sup> channel antagonist medicines.

# Peppermint

## «*Mentha x piperita*»

### Chemical composition and mechanism of action:

- Peppermint extracts and peppermint oil exert a **choleretic effect**.
- Vaporized menthol **increases the soluble mucus** content in the bronchi and **decreases the viscosity of the respiratory tract fluid**.
- The possible explanation of this phenomenon maybe that **menthol presumably acts upon trigeminal sensory nerve endings within the nose**.
- Extracts of the leaves and the oil possess **antioxidant** and **antimicrobial** effects against some bacteria.

# Peppermint

## «*Mentha x piperita*»

### Efficacy and indications:

- The efficacy of peppermint leaf as a mono component preparation has not been studied.
- It can be used as a traditional herbal medicinal product
  - ✓ for the symptomatic relief of digestive disorders such as dyspepsia and flatulence.
- Its **daily dose is 4.5-9 g as a herbal tea**, or **6-9 ml as a tincture**. For children, only herbal tea may be used (prepared from 3-5 g daily).

# Peppermint

## «*Mentha x piperita*»

### Efficacy and indications:

- The efficacy of peppermint oil has been assessed in several clinical trials.
- In double blind,-crossover studies of irritable bowel syndrome, the effect of 0.2-1.2 ml of peppermint oil daily was compared with that of placebo. The patients felt **significantly better and experienced less disease-related symptoms** while taking peppermint oil capsules.
- Topical intraluminal administration of peppermint oil during endoscopy and colonoscopy, **resulted in a superior antispasmodic effect** to that of placebo in several studies.

# Peppermint

## «*Mentha x piperita*»

### Efficacy and indications:

- The effect of a locally applied peppermint oil preparation (10% in ethanol) on **tension-type headache** as compared with acetaminophen and placebo was examined in a randomized, placebo-controlled double-blind crossover study.
- Relative to the placebo, the peppermint preparation **significantly reduced the headache intensity after only 15 minutes.**

# Peppermint

## «*Mentha x piperita*»

### Efficacy and indications:

- The clinical evidences reveals that peppermint oil can be used as a well-established medicine with the following indications:
  - **symptomatic relief of minor spasms of the gastrointestinal tract, flatulence and abdominal pain, especially in patients with irritable bowel syndrome,**
  - **symptomatic relief of mild tension-type headache (external use).**
- For oral use, the **daily dose is 0.6-1.2 ml**. To relieve headache, a solution containing 10% of the essential oil should be rubbed onto the skin of the forehead and temples every 15 minutes.

# Peppermint

## «*Mentha x piperita*»

### Efficacy and indications:

- In the lack of clinical data, the oil can be used as a **traditional herbal medicinal product** with the following indications:
  - relief of symptoms in coughs and colds (external use)
  - symptomatic relief of localized muscle pain (external use)
  - symptomatic relief of localized pruritic conditions in intact skin (external use)
  - relief of symptoms in coughs and colds (inhalation)
  - relief of symptoms in coughs and colds (mucosal use).
- Externally, preparations containing **2-20% of the essential oil can be used**. For inhalation, **2-4 drops are applied up to three times daily**, and for mucosal use **2-3 drops, 3-4 times per day**.

# Peppermint

## «*Mentha x piperita*»

### Side effects, interactions & contraindications:

- Peppermint preparations should not be used below the age of 4 years.
- In the event of gastro-esophageal reflux, peppermint leaf preparations **should be avoided** because heartburn may increase.
- Patients **with gallstones and any other biliary disorders** should be cautious in using peppermint leaf preparations.
- Hypersensitivity reactions such as **skin rash, contact dermatitis and eye irritation** have been reported.
- During inhalation, **apnea, and broncho- and laryngoconstriction** have been reported in hypersensitive patients.