

Phytotherapeutic and naturopathic adjuvant therapies in otorhinolaryngology

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Abstract Phytotherapeutic pharmaceuticals and herbal medicinal products with its roots in classical phytotherapeutic medicine have a well-established role in otolaryngological therapy, especially for diseases of the upper airways and acute and chronic infections. A thorough selection and application could mean huge benefit for the patient, in particular in cases with contraindications, chemo- and antibiotic resistance or patient request. Besides, it might spare other medications. Phytotherapeutic pharmaceuticals must fulfil the same criteria of quality, effectiveness and harmlessness of evidence-based medicine like chemical pharmaceuticals, although they are often prescribed due to its well established or traditional based use. This review focuses on phytotherapeutic therapies well established within the European Community for otolaryngologic disease patterns by referring to clinical studies or meta-analysis.

Keywords Phytotherapy · Naturopathy · Essential oils · Acute rhinosinusitis · Acute otitis media

Introduction

Henri Leclerc (1870–1955) introduced the terminology of phytotherapy into medical science. Natural products were used in non-scientific manner before. People experienced natural products as being helpful for their health and learned to treat illnesses disease-specific. Therefore, it is appropriate to discuss phytotherapeutic and naturopathic

adjuvant therapies in a disease oriented manner. Phytopharmaceuticals consist of a main ingredient that is responsible for the main mechanism of efficacy and of auxiliary agents, backing agents (effecting pharmacokinetics) and structure stabilizing agents. Often phytotherapeutic pharmaceuticals are composed of numerous herbal products or agents increasing medical effectiveness.

Generally speaking, phytopharmaceuticals are not used in emergency medicine and acute care medicine, but are indicated in diseases of mild to intermediate severity, in particular in cases of functional or chronic diseases. Adjuvant or co-therapy, relapse prevention, reconvalescence and unverified disorders are other indications for phytopharmaceuticals.

In contrast to chemical pharmaceuticals, phytotherapeutics possess a wider therapeutic range, lesser adverse reactions and less interactions with other pharmaceuticals. As well as in chemical pharmaceuticals, thoroughly underdosage, false applications and application duration have to be regarded and overestimation of effectiveness has to be avoided. Administration form and usage have to be tailored to the individual patient needs (Table 1). Consequently, adequate diagnostic means must proceed the administration of phytopharmaceuticals.

Evidence-based medicine has entered phytotherapeutic medicine as well and therefore its benefits and advantages have been established in clinical studies and meta-analysis in the last years. In addition, due to the long tradition of phytotherapy individual-based and experienced-based medicine provide the basis for consideration of off-label-use in cases where clinical studies are missing.

Acute and chronic rhinosinusitis

In otolaryngology, phytopharmaceuticals which combine secretolytic, mucolytic, mucous membrane detumescing,

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Table 1 Mode of preparation and administration form of phytotherapeutics

Mode of preparation	Administration form	Therapeutical application and characterization
Aqueous extracts		
Extracts with ethanol (tincture, fluid extracts)	Drops, inhalations, gargle solutions	Contain about 20–60% alcohol
Extracts with wine	Tonics, medicated wines	Contain about 16% alcohol
Spissum extracts	Baths, gels, soft gelatin capsules	Baths are in particular useful in early infections and should not be used when body temperature is increased
Alcoholic distillates	Contain essential oils, e.g. spirit of melissa	Contain 40–80% alcohol
Steam distillates	Essential oils	Most essential oils have to be diluted (e.g. in sunflower, peanut, almond oil 1/9) to avoid mucosal irritation or combined with a plant oil for skin preparations
Tea	Infusion Decoction Maceration (cold preparation)	For small plant parts, thermolabile and volatile ingredients For not easily dissoluble plant parts and ingredients Plant parts where hot preparation would damage or release damaging ingredients
Juices	Fresh-squeezed plant juices	Contain four times more active ingredients than tea
Creams, ointments, gels	Inunctions, fomentations	Selection and application according to skin moisture
Dry preparations (shredded, pulverized)	Tablets, dragees, pastilles, pellets, capsules	For systemic application

secretomotoric, antiphlogistic and antimicrobial properties are classically used in diseases of the upper airways. Nose douches or inhalations with Emser brine or chamomile flower solutions represent usually the basal treatment in banal or allergic rhinitis. In addition, applied nasal sprays with seawater and chamomile avoid privinism. Essential oils of eucalyptus leaf and branch (*Eucalyptus globulus*, *E. polybractea* or *E. smithii*, Myrtaceae), peppermint leaf (*Mentha piperita*, Lamiaceae), mugo pine (*Pinus mugo*, Pinaceae) have secretolytic and antimicrobial effects, but should not be applied in infants due to the danger of laryngo- or bronchospasm (Kratschmer reflex). Together with its ingredients, menthol, camphor and 1,8-cineol they depolarize the thermoreceptors by inhibition of the calcium influx (Table 2) and lead to a subjective improvement of airflow although the nasal resistance is not decreased [1]. Systemic administered phytopharmaceuticals containing essential oils like GeloMyrtol[®] gastro-resistant capsules (standardized to contain not less than 30 mg limonene, 30 mg cineol and 8 mg alpha-pinene, manufactured by G. Pohl-Boskamp GmbH & Co KG, Hohenlockstadt, Germany) have shown increase of the mucociliary secret transport velocity by 28% and of the secretolysis by 30% [2]. GeloMyrtol[®] is administered in acute and chronic rhinosinusitis and after operations of the paranasal sinuses as well (Table 3) [3]. The combination herbal medicine Sinupret[®] contains powdered herbal extracts of European elder flower (*Sambucus nigra*, Caprifoliaceae), garden sorrel herb (*Rumex acetosa*, Polygonaceae), cowslip flower (*Primula veris*, Primulaceae), European vervain herb

(*Verbena officinalis*, Verbenaceae), gentian root (*Gentiana lutea*, Gentianaceae) and liquefies the nasal mucous and secretions and acts antiphlogistic as well. A meta-analysis has shown that alternate application of GeloMyrtol[®] and Sinupret[®] has best benefits in acute and chronic rhinosinusitis [4] and can be used in pregnancy, too [5]. Besides Sinupret[®] and GeloMyrtol[®] can be used in acute and chronic bronchitis [6] and it could be shown that the efficacy of Sinupret[®] is superior to ambroxol and *n*-acetylcysteine [7–9]. It could be shown that Tesalin N[®] film tablets (containing a CO₂-extract, Ze 339, of purple butterbur leaf (*Petasites hybridus*, Asteraceae), manufactured by Zeller Medical AG, Romanshorn, Switzerland) are as effective as fexofenadin and cetirizin in allergic rhinitis [10, 11]. A meta-analysis showed equivalent effectiveness when compared with non-sedative antihistamines [12].

Acute and chronic laryngopharyngitis

About 50–70% of acute infections of the pharyngolaryngeal spaces are of viral pathogenesis [13–15]. Therapeutic considerations of antibiotics with regards to microbial etiology starting point and duration of application or cost-effectiveness have been discussed extensively. Generally speaking, antibiotics have to be applied, whenever complications occur. Typically, gargle solutions with sage leaf (*Salvia officinalis*, Lamiaceae), thyme herb (*Thymus vulgaris*, Lamiaceae) or chamomile flower (*Matricaria recutita*, Asteraceae) are applied in acute laryngopharyngitis. Imupret[®] dragees or drops (a combination herbal medicine

Table 2 Phytotherapeutic therapy of upper airway and deglutition tract infections

Main mode of action	Phytotherapeutics	Characterization
Antiphlogistic	Chamomile flower, myrtle, thyme herb, sage leaf	α -Bisabolol and chamazulene in chamomile inhibit the cyclooxygenase and lipoxygenase of arachidonic acid cascade
Antitussive-mucous releasing	Marshmallow leaf or root, ribwort plantain leaf, iceland moss thallus	Contain polysaccharides which swell with water
Antitussive-mucolytic (saponins)	Cowslip flower, thyme herb, english ivy leaf, mullein flower	Decrease mucous viscosity by decreasing the surface tension of water
Respiratory relieving, secretolytic	Mint oils (eucalyptus leaf and branch, peppermint leaf, mugo pine) Menthol, camphor, 1,8-cineol	Central inhibitory effect by thermosensitive nerves Cave: Kratschmer reflex in children Depolarization of thermoreceptors by inhibition of calcium influx
Antimicrobial	Garden nasturtium haulm, horseradish root	Contains mustard oils
Antipyretic	Lime flower, willow bark, european elder berry	The lacking acetyl group in salicin in elder avoids side effects of ASA
Immunomodulating	Echinacea root, chamomile flower	Stimulation of the unspecific cellular and humoral immune response Cave: application duration, autoimmune and systemic diseases

manufactured by Bionorica AG, Neumarkt, Germany) can be used in chronic tonsillitis, tracheitis or in adenoid hyperplasia and acts antiphlogistic, astringent and immunomodulating. It contains aqueous-alcoholic extracts of marshmallow roots (*Althaea officinalis*, Malvaceae), chamomile flower, oak bark (*Quercus robur*, *Q. Petraea*, *Q. pubescens*, Fagaceae), English walnut leaves (*Juglans regia*, Juglandaceae), dandelion herb (*Taraxacum officinale*, Asteraceae), horsetail herb (*Equisetum arvense*, Equisetaceae) and yarrow flower (*Achillea millefolium*, Asteraceae) [16]. Two important phytotherapeutics with antimicrobial qualities are garden nasturtium haulm (*Tropaeolum majus*, Tropaeolaceae) and horseradish root (*Armoracia rusticana*, Brassicaceae) which contain mustard oils that have antibacterial properties against gram-positive and gram-negative strains, virostatic and antimycotic effects and can be used when antibiotics should be avoided. The combination herbal medicine Angocin[®] (film tablets, manufactured by REPHA GmbH Biologische Arzneimittel, Langenhagen, Germany) uses synergistic effects of these two herbs. In particular, efficacy against *Pseudomonas* species has been proven and studies showed equivalent efficacy compared with standard antibiotics [17–19]. Willow bark (*Salix purpurea*, *S. daphnoides*, *S. fragilis*, Salicaceae) decreases the body temperature directly due to its main ingredient salicin which in contrast to acetylsalicylic acid (ASA) lacks the acetyl-group and therefore has no adverse reactions in regards with stomach mucosa and platelet aggregation. Standardized willow bark extracts has comparable antiinflammatory activities as higher doses of ASA and shows antinociceptive and

antipyretic effects [20]. Besides European elder berry (*Sambucus nigra*, Caprifoliaceae) and lime flower tea (*Tilia platyphyllos*, *T. cordata*, *T. vulgaris*, Tiliaceae) are often used to reduce body temperature and it could be shown that elder berry preparations reduce symptoms and illness duration 4 days faster when compared with placebo syrup in influenza A and B infections [21]. Marigold (*Calendula officinalis*, Asteraceae) and pelargonium root (*Pelargonium sidoides*, Geraniaceae) are successfully used in the treatment of upper infections of the respiratory tract and for acute and chronic tonsillitis as well [22, 23]. They have antibacterial, antiviral and secretolytic functions, but have to be applied in tonsillitis off-label as clinical data are not sufficient [24, 25].

Cough

Acute and chronic cough impair the general condition and should often be avoided after surgical interventions. Suppressing the need to cough can be achieved by physical and pharmacological measures. Main physical supporting measures include intake of fluids by drinking, inhalation and air humidification. A productive cough is often preceded by a dry and painful cough. Different phytotherapeutics have to be used in these disease stadiums. Opium alkaloids like codeine or noscapine have a direct antitussive effect on the CNS cough center in the medulla oblongata and the sensory nerves in the lower airways. They are applied in the phase of dry cough and mainly administered at night and only for a short time. Alternatively, phytopharmaceuticals that possess an antitussive

Table 3 Discussed phytotherapeutic pharmaceuticals and their indication, administration form and dose

Phytotherapeutic pharmaceutical	Indication	Administration form	Dose
Angocin [®] , REPHA GmbH Biologische Arzneimittel, Langenhagen, Germany	Phytotherapeutic pharmaceutical with antibacterial properties against grampositive and gramnegative strains, virostatic and antimycotic effects Acute infections (e.g. acute pharyngotonsillitis, acute laryngitis, acute sinusitis)	Film tablet	4–5 tablets 3–5 times per day, children (4–8 years) 2–3 tablets 3–5 times per day
Bronchipret [®] , Bionorica AG, Neumarkt, Germany	Acute and chronic bronchitis Expectorant	Drops, syrup or film tablet	Drops: 40 drops 4 times per day, adolescents (12–18 years) 28 drops 4 times per day, children (6–11 years) 20 drops 4 times per day Syrup: 5.4 ml 3 times per day, babies (–12 month) 1.1 ml 3 times per day, infants (–2 years) 2.2 ml 3 times per day, children (–6 years) 3.2 ml 3 times per day, children (–12 years) 4.3 ml 3 times per day Tablets: 1 tablet 3 times per day
Contramutan [®] N, manufactured by A. Nettermann & Cie. GmbH, Cologne, Germany	Acute infectious of the upper airways (e.g. acute laryngopharyngitis)	Drops, syrup or tablet	Drops: 5–10 drops up to 12 times per day, children (6–12 years) 4–7 drops up to 12 times per day, children (1–6 years) 3–5 drops up to 12 times per day; after symptom relief intake is reduced to 3 times per day Syrup: 15 ml every hour, children 5 ml every hour; after symptom relief intake is reduced to 3 times per day Tablets: 1 tablet up to 12 times per day, children 1 tablet up to 6 times per day; after symptom relief intake is reduced to 1–3 times per day
Equisil [®] N, Dr. Gustav Klein GmbH & Co KG, Zell am Hamersbach, Germany	Intermediate cough state (productive and dry)	Syrup	2.5 ml 3 times per day
Esberitox [®] , Schaper & Bruemmer GmbH & Co KG, Salzgitter, Germany	Acute infectious of the upper airways (e.g. acute laryngopharyngitis)	Drops, tablet	50 drops or 3 tablets 3 times per day, babies 10 drops or 1 tablet once per day, children (–6 years) 15 drops or 1–2 tablets twice per day, children (–12 years) 25 drops or 2 tablets twice per day
GeloMyrtol [®] forte, G. Pohl Boskamp GmbH & Co KG, Hohenlockstadt, Germany	Acute and chronic rhinosinusitis Acute and chronic bronchitis Postoperative convalescence Pregnancy	Gastro-resistant capsule	1 capsule 3–4 times per day for acute infections, 1 capsule twice for chronic infections
Imupret [®] , Bionorica AG, Neumarkt, Germany	Chronic tonsillitis, tracheitis, adenoid hyperplasia	Dragee or drops	2 dragees or 25 drops 5–6 times per day, children (–12 years) 1 dragee or 15 drops once per day, babies and infants 5–10 drops 5–6 times per day; after symptom relief intake is reduced to 3 times per day for 7 days
Lomaherpan [®] , Lomapharm Rudolf Lohmann GmbH KG, Emmerthal, Germany	Skin or mucosa infections with herpes simplex virus	Cream	10–20 mg per cm ² 2–4 times per day
Otikon Otic [®] solution, Healthy-On Ltd., Petach- Tikva, Israel	Acute otitis media	Ear drops	5 drops 3 times per day

Table 3 continued

Phytotherapeutic pharmaceutical	Indication	Administration form	Dose
Prospan [®] , Engelhard Arzneimittel, Niederdorfelden, Germany	Productive cough Expectorant	Drops, liquid, syrup, suppository, fizzy tablet or film tablet	Drops: 24 drops 3 times per day, children (4–10 years) 16 drops 3 times per day, children (1-year) 12 drops 3 times per day Liquid: 5 ml 3 times per day Syrup: 5–7.5 ml 3 times per day, children (6–9 years) 5 ml 3 times per day, children (1–5 years) 2.5 ml 3 times per day, children (<12 month) 1.5 ml twice per day Suppositories: school children 1 supp. 3 times per day, babies and infants 1 supp. twice per day Brausetabletten: 1 tablet twice per day, children (4–12 years) ½ tablet 3 times per day Film tablets: 2 tablets 3 times per day
Sinupret [®] , Bionorica AG, Neumarkt, Germany	Acute and chronic rhinosinusitis, Acute and chronic bronchitis Postoperative convalescence Pregnancy	Drops, liquitab [®] , dragee	50 drops, 2 dragees or 2 liquitabs three times per day, children (6–12 years) 25 drops, 1 dragee or 1 liquitab per day, children (2–6 years) 15 drops per day
Tesalin [®] N, Zeller Medical AG, Romanshorn, Switzerland	Allergic rhinitis	Film tablets	1 tablet 2–3 times per day

and abirritative effect by contain polysaccharides that swell with water and produce a mucous layer inhibiting the hyperactive ciliary activity can be applied in dry cough. These phytopharmaceuticals usually contain marshmallow leaf or root (*Althaea officinalis*, Malvaceae), ribwort plantain leaf (*Plantago lanceolata*, Plantaginaceae) or iceland moss thallus (*Cetraria islandica*, Parmeliaceae). A productive cough should be treated with expectorations like cowslip flower (*Primula veris*, Primulaceae), thyme herb, English ivy leaf (*Hedera helix*, Araliaceae) or mullein flower (*Verbascum densiflorum*, *V. phlomoides*, *V. thapsus*) [26]. Syrup can be used for children [27]. These plants contain saponins which decrease mucous viscosity by decreasing the surface tension of water, increase ciliary activity and possess an antiphlogistic and bronchospasmolytic effect [28]. A combination of both mucous-releasing and secretolytic acting ingredients can be used in an intermediate cough state, e.g. Equisil[®] N Syrup (containing extracts of cowslip flower, mullein flower, thyme herb and ribwort plantain leaf, manufactured by Dr. Gustav Klein GmbH & Co KG, Zell am Hamersbach, Germany). Various studies have shown similar or superior effects of phytopharmaceutical expectorations compared to acetylcysteine or ambroxol. Prospan[®], a dried ivy leaf extract (drops, liquid, syrup or tablets, manufactured by Engelhard Arzneimittel, Niederdorfelden, Germany), showed superiority to acetylcysteine [29] and Bronchipret[®] film tablets

(dried alcoholic extracts of primula root and thyme herb, manufactured by Bionorica AG, Neumarkt, Germany) showed equivalency to ambroxol and *n*-acetylcysteine [30, 31]. In addition, essential mint oils due to its secretolytic effects can be inuncted or inhaled. They are well reabsorbed by the skin, e.g. as warm thorax compresses in pseudocroup. Menthol, camphor, 1,8-cineol activate the cold receptors in the larynx and have an antitussive and negative inspiratory effect [32].

Herpes simplex infection and stomatitis

It could be shown that lomaherpan[®] cream (manufactured by Rudolf Lohmann GmbH KG, Emmerthal, Germany) which contains dried extract of lemon balm leaf (*Melissa officinalis*, Lamiaceae) can be used for prophylaxis and is as effective as acyclovir when administered in the first 8 h in herpes simplex infections [33]. Besides, healing is faster and recurrences are reduced [34, 35]. Another study showed that rhubarb-sage cream is as effective as acyclovir [36]. Other therapeutics and preparations that have been effective in herpes simplex infections are propolis [37], ozonated olive oil or essential oils with thyme herb, chamomile flower, ginger root, peppermint leaf, eucalyptus leaf and tea tree foliage (*Melaleuca alternifolia*, *M. dissitiflora*, *M. linariifolia*, Myrtaceae) [38–40]. Topical medications, such as mouth-washes and topical corticosteroids

can achieve the primary goal to reduce pain and to improve healing time but do not improve recurrence or remission rate in recurrent aphthous stomatitis. It could be shown that myrtle (*Myrtus communis*, Myrtaceae) reduces ulcer size, pain severity, erythema and exudation level **in recurrent aphthous stomatitis [41], and a daily intake of 500 mg bee propolis could reduce the outbreaks in recurrent aphthous stomatitis [42]. Candidiasis or thrush can be effectively treated with solutions or tinctures of chamomile flower, myrtle, sage leaf, or thyme herb [43]. Besides, essential oil of thyme herb potentiates the antifungal effect of amphotericin B in culture [44]. In addition, malodor in cancer patients improves significantly and ulcer healing benefits after essential oil application (in this study an essential oil mix based on eucalyptus was applied twice daily) [45]. Besides, astringencies who have antiinflammatory, weak antiseptic effects and increase tissue repair like arnica flower (*Arnica montana*, Asteraceae), mulberry leaves (*Morus alba*, Moraceae) and silverweed (*Argentina anserina*, Rosaceae) are used in stomatitis, as well as aromatica (essential oil drugs) with its antiphlogistic and antimicrobial effects like clove flower bud (*Syzygium aromaticum*, Myrtaceae), calendula flower or rose blossom (*Rosa* spp., Rosaceae) [46].

Acute otitis media

About 50% of all acute middle ear infections are of viral pathogenesis [47]. Antibiotic usage in uncomplicated acute otitis media in children has been discussed controversial recently [48, 49]. It has been advocated that a watchful waiting period of 2–3 days is adequate before administering antibiotics [50]. However, antibiotics have to be applied whenever complications occur. To reduce the pain, a hot chamber that can be simple made by hot washcloth and a bathing cap is often very helpful. The American Academy of Otolaryngology-Head and Neck Surgery guidelines recommend topical medications as the first line of treatment for ear pain in the absence of systemic infection or serious underlying disease. There is some evidence that in the management of ear pain topical combination herbal medicines (e.g. Otikon otic solution containing extracts of garlic bulb, mullein flower, calendula flower and St. John's wort herb in olive oil, manufactured by Healthy-On Ltd., Petach-Tikva, Israel) are as effective as oral amoxicillin and topical anaesthetics due to its antimicrobial, antiinflammatory, immunostimulating effects and good penetration through the tympanic membrane [51, 52]. Generally speaking, the dosage for phytotherapeutic drugs in children can be estimated for children under 4 years of age with 1/3 of the dosage for adults, children to 10 years take 1/2 and children to 16 years take 2/3 of the adult dosage.

Otitis externa diffusa

Infections of the outer ear canal are often only controlled when systemically and locally treated with longer application duration at the same time. First, cerumen and detritus have to be sucked from the outer ear canal to avoid a growing medium. Phytopharmaceuticals can be of adjuvant benefit for these patients often suffering from systemic diseases as well. Above-mentioned antiviral, antimycotic and antibacterial tinctures, drops or solutions are very useful in otitis externa as well, e.g. otikon ear drops, essential oil drugs, melissae or myrtle tinctures (Loma-herpan[®], lomastatin[®]).

Reflux disease

The importance of gastroesophageal reflux in the aetio-pathogenesis for various diseases of the upper airways and deglutition pathways, including cancerogenesis, is well known in otolaryngology. Reflux disease with a prevalence of up to 20% is a common symptom in western civilizations and can be the reason for other symptoms as globus pharyngis, postnasal drip, cough or halitosis [53]. Besides gastroesophageal reflux affects wound healing negatively. A tea spoon of healing earth (e.g. Luvos[®], Heilerde-Gesellschaft Luvos Just GmbH & Co KG) equating 6.5 g has an acid-binding capacity of 25 mVal that is recommended for an antacidum from the German Federal Institute for Drugs and Medical Devices (BfArM). Asian ginseng root (*Panax ginseng*, Araliaceae) can be used in chronic erosive esophagitis [54] and possesses anticancerogenic effects [55].

Wound care

Acute and chronic wounds benefit from adjuvant phytotherapeutic and naturopathic care, although further research has to be done in this field. In vitro studies have shown the stimulation of keratinocytes cell proliferation of bee propolis in wound healing [56]. Meta-analyses have shown that medical grade honey (Medihoney, standardized antibacterial honey) is suitable as alternative for wound healing, burns, oral and external surgical wounds, various skin conditions and in the cancer setting, e.g. applied for radiation-induced mucositis, radiotherapy-induced skin reactions, hand and foot skin reactions in chemotherapy [57–59]. Ozone or ozonated olive oil application has been used for many years as a method ancillary to basic treatment in acute or chronic wounds, especially in those cases in which traditional treatment methods do not give satisfactory results, e.g. skin loss in non-healing wounds, ulcers, pressure sores, fistulae, etc. [60–63]. Besides, essential oils represent a cheap and antiseptic effective treatment option

for antibiotic-resistant strains of MRSA and antimycotic-resistant *Candida* species [64]. Calendula flower has anti-phlogistic, immunostimulating, cytotoxic, antimicrobial, antiedematous, lymphagogue, phagocytosis and granulocytosis increasing effects and is successfully applied topically and systemic in the prevention and treatment of radiation dermatitis, venous ulcers and postoperative wounds [65–69].

Immunomodulation and immunostimulation

The terminology of immunomodulation should be preferred to immunostimulation as many phytotherapeutics used for a longer time or used in systemic and autoimmune diseases can lead to immunodepression. Therefore, coneflower root (*Echinacea spec.*, Asteraceae) should not be applied longer than 8 weeks in adults and 2 weeks in children at a stretch. Echinacea and combination medicines (e.g. Esberitox[®], manufactured by Schaper & Bruemmer GmbH & Co KG, Salzgitter, Germany or Contramutan[®]N, manufactured by A. Nettermann & Cie. GmbH, Cologne, Germany) can be used in all acute infections and is helpful in acute laryngopharyngitis, in particular [70, 71]. It enhances cell-mediated immunity by stimulation of macrophages, natural killer cells and granulocytes as well as humoral immunity through monokines, interferons and the complement system. Further herbs used for immunomodulating combination herbal medicines or single preparations are thuja herb (*Thuja occidentalis*, Cupressaceae), hemp agrimony (*Eupatorium cannabinum*, Asteraceae), boneset (*Eupatorium perfoliatum*, Asteraceae), wild indigo root (*Baptisia tintoria*, Fabaceae), lime flower, European elder berry, chamomile flower, meadowsweet herb (*Filipendula ulmaria*, Rosaceae) and pelargonium root (*Pelargonium sidoides*, Geraniaceae). Besides, it could be shown that Asian ginseng root (*Panax ginseng*, Araliaceae) accelerates reconvalescence, body weight, leukocytes and serum protein after operations and radiotherapy [72].

Vertigo and kinetosis

Scopoderm is a transdermal patch contain pure scopolamine, an alkaloid of belladonna leaves. It should be administered 4–6 h before the start of a journey. Equivalent effects for motion sickness (kinetosis) have been shown for ginger rhizome (*Zingiber officinale*, Zingiberaceae) [73, 74]. Besides, ginger is well known for nausea and vomiting in pregnancy and postoperative care. Numerous trials, reviews and meta-analyses have shown equivalent efficacy when compared with hydrochloride (vitamin B6) and metoclopramide [75–80]. Extracts of Gingko leaves (*Gingko biloba*, Gingkoaceae) have positive effects on the

microcirculation and can be effectively used in long-time therapy for vestibular vertigo [81, 82].

Conclusion

Phytotherapeutic pharmaceuticals and herbal medicinal products with its roots in classical phytotherapeutic medicine have a well-established role in otolaryngological therapy within the European Community. A thorough selection and application can mean huge benefit for the patient, in particular in cases with contraindications, chemo- and antibiotic resistance or patient request. In complicated cases of upper airway or ear infections chemical antibiotics are indicated, but phytopharmaceuticals can be of additive value. In cases, where clinical studies and meta-analysis are missing, the long tradition of individual-based and experienced-based medicine provide the basis for therapeutical consideration.

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