Spices for Lung Diseases

An exact definition of spices is not possible, although most of us feel that we recognize a spice when we taste it. The better known spices such as pepper, garlic and cinnamon are plant-derivatives that are mainly used as condiments and seasonings to add an aroma, taste or pungency to food.[1,2] Throughout history they have enjoyed reputations as food enhancers and preservatives, and they have been incorporated into health practices along with innumerable other herbal drugs of plant origin. However, current accounts fail to explain why angelica, celery seeds, horseradish, juniper, mustard and onions are usually regarded as spices whereas the equally pungent and stimulatory lime, nasturtium and radish are not accorded such recognition.

Perhaps the oldest drug in continuous popular use throughout much of the world is cinnamon. This spice is obtained from the bark of trees indigenous to southeast Asia, and it has been a valued item of international trade for thousands of years.[3] It was recognized in the Old Testament to be an essential ingredient of incenses and anointing oils for use in temple ceremonies, and it was used in pre-Ayurvedic medications as a remedy for gastrointestinal problems. The oil of cinnnamon contains cinnamaldehyde and cinnamic acid—agents with anti-bacterial and anti-fungal properties whose addition to food may help prevent its decay. Although cinnamon is rarely used as a medication today, its potent chemicals undoubtedly do have physiological and possibly therapeutic effects. In contemporary Ayurvedic practice, one of its indications is for the treatment of cough.[4]

The most important therapeutic properties of spices may be their effects on the lungs. Garlic, with its easily recognizable aroma, is listed in Martindale's *Extra Pharmacopoeia* as an expectorant, and it is used for this purpose in many parts of the world.[5] This effect was recognized by William Harvey in 1621. He was impressed by the fact that garlic placed on the feet was excreted in the breath, thus providing evidence that blood circulates from the periphery to the lungs.[6]

The chemical formulation of the major constituent of garlic, that is alliin or S-allyl-L-cysteine sulphoxide, is of great interest. When the garlic clove is crushed, the enzyme alliinase is released, and this converts alliin to allicin, which has the characteristic garlic odour. Reduction of alliin results in S-allyl-L-cysteine which is reminiscent of N-acetyl-L-cysteine, better known as the potent mucolytic drug acetylcysteine (Mucomyst, Fluimucil). However, the chemical constitution of S-allyl-L-cysteine more closely resembles that of S-carboxymethylcysteine, a proprietary oral mucus-loosening drug which is classified as a mucoregulator.[7] This agent occurs naturally in plant sources such as the radish, which is used in Ayurvedic medicine for asthma and cough.[4] Garlic may also act as a mucoregulator—a term which implies that its chronic intake can slowly improve the quality of abnormal secretions in pulmonary diseases. Thus, chronic intake of garlic may be very beneficial for bronchitis, and it has been editorially suggested that it be incorporated with cigarettes, where its antioxidant effects would provide further protection for the lungs.[8]

Numerous other mucoregulators are marketed in Europe and these include Sobrerol—a derivative of the α-pinene obtained from pine tree oil—and agents derived from the Malabar nut tree (*Adhatoda vasica*). The latter has for long played a part in Ayurvedic medicine as its active constituent, *vasaka*, was used as an inhalant for treating asthma, bronchitis and tuberculosis. Awareness of this traditional practice led to the extraction and marketing in Germany of bromhexine (Bisolvon) and its derivative, ambroxol (Mucosolvan).

Pungent spices contain active chemicals, some of which have important physiological properties. The fiery chilli pepper owes its stimulatory qualities to capsaicin, which in recent years has become an important laboratory tool in

the evaluation of pulmonary nerve function. Capsaicin is a potent liberator of substance P from non-adrenergic, non-cholinergic (NANC) nerve terminals in the airways. Substance P can induce various respiratory tract effects including sneezing and the secretion of mucus.[9] Black pepper and the related yellow pepper contain pimetine; although not evaluated in the lungs, it probably has a similar action to that of capsaicin. Mustard and horseradish contain allyl isothiocyanate, an extremely irritating agent which induces lachrymal, nasal and respiratory gland secretion. Onion contains numerous pungent sulphur volatiles which have a similar stimulatory effect on lachrymal and respiratory exocrine glands. Although the major pungent vegetable spices have marked topical effects on the respiratory mucosa, in practice they are mainly given orally. There is good evidence that they act on the lungs through a gastropulmonary expectorant reflex.[7] Pungent foods contain chemicals that activate gastric receptors causing an afferent reflex through the medulla of the brain. A maximal stimulus affects the emetic centre in the medulla, and the efferent part of the reflex arc evokes vomiting. A lesser stimulus can activate the respiratory and cough centres in the medulla, and appears to act on an adjacent mucokinetic centre. The latter provides efferent vagal fibres to the bronchial gland and reflex activation results in a marked increase in basal respiratory tract secretion, leading to enhanced expectoration.

Virtually any spice, herb or chemical whose odour can be detected on the breath following oral ingestion can act as an expectorant.[10] In recent years, it has been shown that some of the pungent spices such as onion also have an anti-asthmatic effect.[11] The smoking of cubeb cigarettes, made from the dried unripe fruit of a Javanese plant, was previously a popular therapy for asthma.[3,7] Onion, garlic and other spices have also long been attributed with the ability to prevent or alleviate colds and sore throats, but this has not been subjected to any controlled study. One of the favoured traditional remedies was the mustard plaster, which was positioned on the back or chest to treat bronchitis and pneumonia, and even pulmonary oedema. Alas, the value of this venerable remedy also awaits formal proof.

In western medicine, chicken soup is known for its ability to alleviate colds and bronchitis. However, garlic, pepper and curry powder should be added to the recipe to enhance its mucus-loosening effect.[12] It is worth recalling that a spicy diet was well recognized in mediaeval Europe to be useful in the treatment of asthma and, moreover, the same therapeutic recipe had the remarkable side-effect of serving as an aphrodisiac.[13]

One can only lament that much of the information on the health effects of spices is generated by popular books on alternative medical systems directed at those disenchanted members of the public who feel that orthodox medical practice has not met their needs. Although much is known about spices as drugs,[1,2,4] relatively little scientific work has been carried out to evaluate the effect of pungent spices and their major chemical constituents on pulmonary physiology. Thus, the potential pharmacological benefits of spices lack the endorsement of modern medicine in spite of the suggestive historical and chemical attributes that support their use.

India is the home of most spices, and of many current studies on spices as drugs.[14,15] It would be reasonable to look to the investigative talents of Indian scientists and physicians to establish a firmer basis for the therapeutic use of spices, and in particular to establish which spices are good for the breath.

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