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Herbs and spices in medicinal preparations

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When herbs and spices are mentioned, my thoughts automatically turn to food and drink. I think it is reasonable to assume that the same is true for most people—that is, herbs and spices are first and foremost associated with their use in foods and drinks. However, herbs and spices have numerous uses beyond their value as food additives. This paper is intended to survey one of those less known applications; the use of herbs and spices in a number of selected medicinal preparations.

The role of herbs and spices in medicinal preparations is rather different from that which we, in the western world, tend to associate with their role in foods. We expect that the presence of these plants (or their extracts) will produce a subtle extra flavour in foods or drinks. There are, of course, exceptions, but it is probably valid to say that in most instances in which herbs or spices are added to foods, they would not be expected to produce the dominant flavour. This is not, however, the case in medicinal preparations. Herbs or spices are added to medicines to produce a dominant flavour or smell much as they were probably added to meat and game before the advent of refrigeration, when it was necessary to mask unpleasant flavours or odours resulting from deterioration.

Herbs and spices have been used thus in medicinal preparations from the very earliest of times. This is because, in many instances, the active principles of the medicinal preparations were virtually unpalatable. The herbs or spices were added to disguise unpleasant flavours and odours to make a consumer-acceptable product. An example of this is the way in which these plant materials have been used through the ages to mask the flavour of opium. Opium contains several alkaloids; the principle ones of interest to

medicine are morphine, codeine, and papaverine, which impart an extremely bitter taste to the drug. Opium has been the basis of many preparations used both therapeutically and for social pleasures, from the time of the Egyptian dynasties.¹

In most known preparations, the opium has been mixed with herbs and/or spices in order to render its presence acceptable to the consumer. Examples of this are to be found in the theriacs of the Galenic system of medicine. Table I shows the herb and spice content of one such remedy, that of Mithridate—the original formulation for which was attributed to Mithridates the Great (born B.C. 134). The last official monograph for this preparation appeared in the London Pharmacopeia 1746.

Other examples of mixtures of opium with spices and herbs are the solid laudanums of Paracelsus—simple preparations containing only a handful of ingredients rather than the fifty or sixty which were incorporated into formulations such as Mithridate, and the liquid laudanums attributed to the English physician Thomas Sydenham. Sydenham's laudanum was a tincture of opium in port wine flavoured with saffron. Kuknar, a traditional liquid or solid preparation containing opium with spices, was formerly popular in India on social occasions.² Bala Golis—small pills based upon opium flavoured with cinnamon and cardamom—were also formerly very widely used in India for the purpose of subduing (sometimes permanently) noisy infants.³

In the current British *Pharmacopoeia* the preparation camphorated opium tincture occurs. It has anise oil as a part of the masking flavour for the opium.⁴ In all of these preparations the herbs and spices were incorporated to disguise the extremely bitter taste of

Spices in medicinal preparations

Table I. Herb/spice content of Mithridate (ex London Pharmacopoeia 1746)

Anise	Mace
Cardamom Seeds	Oil of Nutmeg
Cinnamon	Long Pepper
Fennel Seeds	White Pepper
Ginger	Saffron
French Lavender	Zedoary

Table II. Herbs/spices subject to current official British/European monographs (for use in medicinal preparations)

British Pharmacopoeia 1973	British Pharmaceutical Codex 1973	European Pharmacopoeia
Anise	Capsicum	Anise
Caraway	Dill	Roman Chamomile Flowers
Cardamom	Fennel	Matricaria Flowers
Cinnamon	Lavender	Peppermint
Clove	Nutmeg	Saffron
Coriander	Rosemary	
Ginger	Spearmint	
Peppermint		

Table III. Forms in which each herb/spice is used in medicinal preparations

Herb/Spice	Total number of preparations into which herb/spice is incorporated	Form in which herb/spice incorporated		
		Whole Drug	Volatile Oil	Alcoholic Extract
Anise	16	-	16	-
Capsicum	1	-	-	-
Caraway	2	-	2	-
Cardamom	9	3	6	-
Cinnamon	6	3	3	-
Clove	5	3	2	-
Coriander	10	-	10	-
Dill	1	-	-	-
Fennel	1	-	1	-
Ginger	6	2	-	4
Lavender	2	-	2	-
Nutmeg	4	3	1	-
Peppermint	16	-	16	-
Rosemary	1	-	1	-
Spearmint	-	-	-	-

Table IV. Volume of peppermint oil used in three B.P.C. mixtures which act upon the gastro-intestinal tract

	Number of NHS prescriptions dispensed during 1978	Assumed average prescription volume (ml.)	Incorporation rate of oil % v/v	Total volume of mixture dispensed (litres)	Total volume of oil required (litres)
Magnesium trisilicate mixture BPC	1,130,000	300	0.05	339,000	170
Kaolin & morphine mixture BPC	778,000	200	0.004	155,600	6
Kaolin mixture BPC	584,000	200	0.05	116,800	58

Table V. Volume of volatile oil used in three B.P.C. mixtures which act upon the respiratory system

	Number of NHS prescriptions dispensed during 1978	Assumed average prescription volume (ml.)	Incorporation rate of oil % v/v	Total volume of mixture dispensed (litres)	Total volume of oil required (litres)
Ipecacuanha and morphine mixture BPC Peppermint	603,000	300	0.004	180,900	7
Squill linctus opiate, BPC Anise	528,000	200	0.100	105,600	106
Simple linctus BPC Anise	431,000	200	0.020	86,200	17

the opium alkaloids. Likewise, many other alkaloid-containing plants—for example, belladonna, ipecacuanha, and cinchona—were, and still are, mixed with herbs and spices to produce a preparation palatable to the consumer.

This traditional use of natural flavourings has continued to the present day, and many of the galenicals in current national pharmacopoeias and formularies are flavoured with extraction products of herbs and/or spices. The extraction product is quite often the volatile oil, as with anise, clove, and peppermint, but it can also be an alcoholic extract, from ginger, for example. Sometimes, the plant material itself is used in the form of a finely divided powder, as with cinnamon, cardamom, and fennel. Whatever the form in which the herb or spice is used, however, the basic requirement is that the flavour or odour of the plant or combination of plants should be the dominant sensory influence on the preparation. They should mask the underlying flavour or odour of the active ingredients and so render the preparation acceptable for use.

The use of the herbs and spices mentioned so far has no relation to the therapeutic effects of the medicinal preparation in which they occur. There are, however, a few herbs and spices that are used because of their supposed therapeutic action. One example of this is *Capsicum annum*, which contains capsaicin and related compounds, which are highly irritant to mucosal surfaces or broken skin. Extracts of this plant are used both internally and externally to produce a localised warming effect. Another such therapeutic application is the use of clove oil, which has some local anesthetic properties and which has long been incorporated into tooth tinctures, for local application to relieve the pain of toothache.

A recent report in the *British Medical Journal* has highlighted the beneficial effect of peppermint oil, enclosed in enteric coated capsules, in the treatment of irritable bowel syndrome.⁵ It should be noted that several herb- and spice-derived volatile oils, such as peppermint, nutmeg, and cardamom, which are incorporated into medicinal preparations formulated to act specifically upon the gastrointestinal tract, for example, "stomach bottles," indigestion tablets, are claimed to be therapeutically effective. This may or may not be the case, but their primary function in these preparations is as a flavouring agent.

To determine the extent of the usage of herbs and spices in medicinal preparations, it is most convenient to divide these preparations into two categories.

- those subject to official national pharmacopoeial or formulary monographs
- those which are nonofficial proprietary preparations, whether for sale directly to the public or by prescription of a medical practitioner

First we will examine those herbs and spices that constitute the first category. This includes those herbs and spices subject to official monographs. For convenience I have chosen those herbs and spices occurring in the *British Pharmacopoeia* 1973, the *British Pharmaceutical Codex* 1973 and the *European Phar-*

macopoeia. A similar exercise could have been undertaken using any national pharmacopoeia or formulary, be it American, Belgian, French, German, or, as in this case, British. All would have given similar results. Of necessity, some of the herbs and spices included would vary from one country to another. However, after examining the monographs in the official British standards, I think that it will become apparent that, from the whole range of herbs and spices which are available, only a restricted number are currently used in any one country's official medicinal preparations. The list of herbs and spices in current use in any one national pharmacopoeia or formulary is much shorter than it would have been had similar official standards of forty or fifty years ago been consulted.

The first and second columns of Table II shows those herbs and spices included in some form in the *British Pharmacopoeia* 1973 as well as those listed in the *British Pharmaceutical Codex* 1973 that are not also listed in the *British Pharmacopoeia* 1973. This gives a total of fifteen herbs and spices currently incorporated into formulations that occur in one or other of these official standards. By comparison, the third column of Table II shows those herbs and spices listed in the *European Pharmacopoeia*. Only anise and peppermint are common to both lists—this is quite significant, as will be seen later.

Perhaps we can look at the frequency of usage of these fifteen herbs and spices and examine whether it is the powdered plant or an extraction product that is favoured for use. In these two standard works, there are fifty preparations containing herbs or spices that can be called consumer products—that is, medicinal preparations formulated for use in either their prepared state or simply diluted with water.

Table III shows the number of these preparations into which each herb or spice is incorporated, together with the form in which each herb or spice is used. Several observations can be drawn from this information.

- The volatile oil of the plant is most often used.
- In many of the preparations, combinations of herbs and spices are used as the flavouring agent. It is quite common to have two, three, or even four herbs or spices in the same preparation. Perhaps this is a carryover from the days when formulations

like Mithridate prevailed.

- Anise and peppermint account for the flavour in over sixty percent of these fifty medicinal preparations, but they are never used together, although they may occur in combination with other herbs or spices.
- Several of the herbs and spices have extremely limited usage in official medicinal preparations.

Peppermint, not unnaturally, tends to predominate as flavouring agent in preparations formulated for their action on the gastrointestinal tract. Anise tends to be favoured in preparations supposedly acting upon the respiratory tract, primarily in preparations formulated as expectorants or antitussives.

In the United Kingdom, the only readily available statistics for the quantities of herb- and spice-derived volatile oils used in medicinal preparations can be obtained by extrapolation from the number of National Health Service prescriptions dispensed for a given product during a twelve month period. Table IV gives the relevant extrapolated data from the number of National Health Service prescriptions dispensed during the twelve months January to December 1978 for three of the most popularly prescribed mixtures acting upon the gastrointestinal tract.

The assumed average prescription volume for the data in both Table IV and Table V is derived from personal observations and from trade information.⁶ Magnesium Trisilicate Mixture B.P.C. is an antacid and carminative mixture and, as with Kaolin Mixture B.P.C., peppermint oil is the sole flavouring agent. On the other hand, Kaolin and Morphine Mixture B.P.C., which is used in the treatment of diarrhoea, is flavoured with treacle and liquorice in addition to peppermint oil. This explains the very low incorporation rate of volatile oil into this product.

Table V shows similar information covering the same period for three of the most popularly prescribed mixtures acting upon the respiratory tract. Squill Linctus, Opiate, B.P.C. and Simple Linctus B.P.C. are primarily antitussives and are flavoured with anise oil. In the case of Squill Linctus, Opiate, B.P.C., one of the major reasons for the high incorporation rate of the volatile oil is to mask the flavour of the opium present in this preparation. Ipecacuanha and Morphine Mixture B.P.C. is an expectorant. It is one of the few preparations acting upon the respiratory tract that is flavoured with peppermint oil in preference to anise oil.

In most cases the annual requirement of volatile oil needed to produce the dominant flavour in a given preparation is relatively small. However, it must be remembered that this is only a part of the total volume of these particular medicinal preparations consumed each year (they can be obtained other than by way of a National Health Service prescription). The use of these fifteen herbs and spices in official preparations is, in the majority of cases, only a small part of their total medicinal use. This applies particularly to peppermint, anise, capsicum, and clove, but for herbs and spices such as dill and fennel, these official preparations may be virtually their sole medicinal use.

Of the fifteen herbs and spices previously listed, capsicum stands out alone as an oddity. This is because the other fourteen herbs and spices are incorporated into their respective formulations to impart either flavour or odour. Capsicum, on the other hand, is incorporated into only one official, consumer ready, preparation—Capsicum Ointment—which does not need to be smelled or tasted. Yet, outside the realm of official formulations, capsicum is widely used both internally and externally for its irritant properties. The warming sensation common to many herbal cough remedies is produced by the judicious addition of capsicum extracts. Many creams, ointments, and liniments intended to relieve rheumatism and muscular pains are formulated using capsicum extracts to produce that warm glow thought by the user to be so beneficial in such illnesses.

This leads to a brief examination of the nonofficial proprietary preparations that contain herbs and spices. Unlike the official preparations so far considered, it is very difficult to estimate the extent of the usage of herbs and spices in these preparations. Many proprietary medicines flavoured with known herbs or spices give no indication in their declared formulations as to the incorporation rate of the flavouring agent. In other preparations the presence or otherwise of these materials is difficult to discern. However, as with official formulations, anise and peppermint are again the most widely used of the herbs and spices as flavouring agents. The incorporation of herbs and spices in nonofficial formulations, in terms of total quantities used, must be many times greater than their use in official formulations. This is primarily because of the vast range of nonofficial herb- and spice-containing preparations available not only nationally but internationally. The range of herbs and spices in these nonofficial preparations covers a far greater spectrum than that found in preparations from any one single national pharmacopoeia or formulary.

Many of the medicinal preparations discussed above fall into the category of traditional medicinal remedies. As such, their total number is on the decline, although the recent resurgence of interest in traditional medicine has to a certain extent temporarily stemmed this decline. However, the current trend for new formulations incorporating a synthetic flavouring agent to be launched onto the market does not augur well for the future. The use of herbs and spices in medicinal preparations will undoubtedly continue to decline gradually during the coming years.

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