

## CHILLIES AS FOOD, SPICE AND MEDICINE: A PERSPECTIVE

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### ABSTRACT

From ancient time chillies has been used as food, spice and household medicine for several common problems such as high cholesterol, high blood pressure, pain to joint, skin problem, and used as carminative, appetizer, stomachic, beverages, relief of pain in neuropathy and counter irritant in treatment of rheumatism, lumbago. While it's biological function is to repel herbivores animals and fungi. Capsicum is derived from the Greek word "Kapsimo" meaning "to bite." [Belonging to family Solanaceae] The therapeutic effect of chillies is due to capsaicin, protein, fixed oil, thiamine and ascorbic acid. This review covers the study of pharmacognosy, pharmacology, its valuable effects, different herbal formulas for various diseases, chillies preparations, marketed formulations along with its major side effects and contraindication.

**KEYWORDS:** chillies, capsaicin, Pharmacognosy, Pharmacology.

### Introduction

Chillies consist of dried ripe fruits of *Capsicum annum* linn. var: minimum, belonging to family Solanaceae. It contains not less than 12% of non volatile ether soluble extractives.<sup>1</sup> It is an important crop in preparation of soups, chili sauce, spicy water etc in country.<sup>2</sup>

### Botanical Classification<sup>3</sup>

Kingdom	Plant
Division	Magnoliophyta
Class	Magnoliopsida
Order	Solanales
Family	Solanaceae
Genus	Capsicum
Species	Annum

## HISTORY:

Chili peppers have been a part of the human diet in the Americas since at least 7500 BC. There is archaeological evidence at sites located in southwestern Ecuador that chili peppers were domesticated more than 6000 years ago,<sup>4,5</sup> and is one of the first cultivated crops in the Central and South Americas<sup>6</sup> that is self-pollinating.

Christopher Columbus was one of the first Europeans to encounter them (in the Caribbean), and called them "peppers" because they, like black and white pepper of the Piper genus known in Europe, have a spicy hot taste unlike other foodstuffs. Upon their introduction into Europe chilis were grown as botanical curiosities in the gardens of Spanish and Portuguese monasteries. But the monks experimented with the chilis' culinary potential and discovered that their pungency offered a substitute for black peppercorns, which at the time were so costly that they were used as legal currency in some countries.<sup>7</sup>

Chillies were cultivated around the globe after Columbus.<sup>8,9</sup> Diego Álvarez Chanca, a physician on Columbus' second voyage to the West Indies in 1493, brought the first chili peppers to Spain, and first wrote about their medicinal effects in 1494.

From Mexico, at the time the Spanish colony that controlled commerce with Asia, chili peppers spread rapidly into the Philippines and then to India, China, Indonesia, Korea and Japan. They were incorporated into the local cuisines.

An alternate account for the spread of chili peppers is that the Portuguese got the pepper from Spain, and cultivated it in India.<sup>10</sup> The chili pepper figures heavily in the cuisine of the Goan region of India, which was the site of a Portuguese colony (e.g., vindaloo, an Indian

interpretation of a Portuguese dish). Chili peppers journeyed from India, through Central Asia and Turkey, to Hungary, where it became the national spice in the form of paprika.

## PHARMACOGNOSY:

Vernacular name :<sup>11</sup>

- English : Chillies, Long Chillies, Red Chillies
- Hindi : Lalmirca
- Marathi : Mirchi
- Kannada : Kempumenasu
- Malayalam : Mulaku, Kappalmulaku, Paccamulaku, Cuvannamulaku
- Sanskrit : Katuvirah, Raktamarichah
- Tamil : Milagai
- Telugu : Mirapakaya
- Ayurvedic : kantkari kul

## DESCRIPTION:

### a) Macroscopic character:

chillies fruits are of various shapes and size which depend upon the commercial variety of the drug. In general it is oblong, conical, 10-20 mm long and 4-7 mm wide. In the glabrous pericarp is attached to cup-shaped five toothed calyx and straight pedicel. Pericarp is orange-red to dark reddish, shrunken and thin. Internally the pericarp is divided into two cells by the membranous dissepiment. Each cell consist of about 5-10 small, flattened, disc shaped whitish yellow seeds. Chillies powder is sternutatory with characteristic odour and extremely fiery, pungent taste. The official limit of pedicel and calices in the drug is about 3 percent.<sup>12</sup>

### b) Microscopic character:

The transverse section of the pericarp of capsicum fruit shows the presence about 5-7 rows of outer epidermis made up of the subrectangular cells. Mesocarp consist of cellulosic polygonal parenchyma. With small vascular bundles and sandy crystal of calcium oxalate. It contains yellowish droplets of the oil which are known as chromatophores. The mesocarp is followed by single layer of larger cellulosic cells. Endocarp is made up of wavy cells, lignified tissues and the patches of sclerenchyma. The dissepiment consists of thin walled parenchyma.<sup>12</sup>

### IDENTITY, PURITY AND STRENGTH<sup>13</sup>:

Foreign matter	: Broken chillies 7 % max.
Total ash	: < 8 %.
Acid-insoluble ash	: < 1.25 %.
Moisture	: 9 % max.
Non volatile Oil	: 9 % min.
Color value	: 2000 c.u. to 7000 c. u.

### CHEMICAL CONSTITUENTS<sup>-14</sup>

Capsicum contains 'capsaicin' which gives pungent taste to the capsicum. Capsicum also contains pigments like 'capsanthin' and 'carotene' which gives red colour to the fruit. Capsicum also contains fixed oils, proteins, ascorbic acid and thiamine. The pungency of capsicum can be destroyed by oxidising agents like potassium permanganate. IUPAC NAME (Chillies): 8-Methyl-N-vanillyl-trans-6-nonenamide<sup>15</sup>

### USES:<sup>16</sup>

- 1] Chillies used as a condiment under the name of cayenne pepper.
- 2] The drug given internally in atonic dyspepsia and flatulence.

- 3] It is used as counter-irritant, in the form of ointment, plaster, medicated wool etc. for the relief of rheumatism, lumbago, etc.
- 4] Capsaicin creams are available for the relief of pain in osteoarthritis, post-herpetic neuralgia painful diabetic neuropathy.
- 5] If powdered red chilli is applied to the part affected by a dog bite, immediately it minimizes the effect of the poison. It also acts as an antiseptic by preventing the formation of pus in the wound.<sup>17</sup>
- 6] Boil water, mixed with one spoonful of powdered chilli and one spoonful of salt in it. If this hot solution is drunk, it is beneficial in cholera.
- 7] Boil water, in which powdered red chilli has been mixed, sprinkle this water on those areas where bed bugs are present, bed bugs will be eliminated.
- 8] When seeds of chillies are swallowed with hot water, then the stomachache due to cold, gets vanished.

### NUTRITIONAL VALUE:<sup>18</sup>

Chillies hold all the best properties for which it is considered as a food. It has been used as a food for many of years.

- Chillies are high in vitamin C (about twice that of citrus fruits) Even after cooking it only loses 30 percent of its vitamin C.
- Dried chillies are very high in vitamin A
- Red chillies are a great source of  $\beta$ -carotene.
- Chillies have antibacterial qualities, and contain bioflavonoids, anti-oxidants most common in apple juice.
- It is effective in protecting against cancer.

- Capsaicin cream is used to lower the sensation of pain in such conditions as arthritis, and other painful chronic condition.

**Table No: 2 The nutritional value of chillies [per100gm]<sup>19</sup>**

Parameters	Chillies Dry	Chillies Green
Moisture	10.000 gm	85.700 gm
Protein	15.000 gm	2.900 gm
Fat	6.200 gm	0.600 gm
Minerals	6.100 gm	1.000 gm
Fibre	30.200 gm	6.800 gm
Carbohydrates	31.600 gm	3.000 gm
Energy	246.000 K cal	29.000K.gm
Calcium	160.000 mg	30.000 mg
Phosphorus	370.000 mg	80.000 mg
Iron	2.300 mg	4.400 mg
Carotene	345.000 µg	175.000 µg
Thiamine	0.930 mg	0.190 mg
Riboflavin	0.430 mg	0.300 mg
Niacin	9.500 mg	0.900 mg
Vitamin C	50.000 mg	111.000 mg
Sodium	14.000 mg	-
Potassium	530.000 mg	-
Phytin Phosphorus	71.000 mg	7.000 mg
Magnesium	--	272.000 mg
Copper	--	1.400 mg
Manganese	--	1.380 mg
Molybdenum	--	0.070 mg
Zinc	--	1.780 mg

## CHILLIES PREPARATION:

There are different chillies preparation viz. chillies oil macerate, chillies essential Oil, chillies powder, chillies extract shown infollow.

### Chillies preparation :

- 1) Chillies oil macerate :  
Encapsulated mixture of whole chillies clove ground into Vegetable oil.
- 2) Chillies essential oil :  
Oil obtained by steam distillation.
- 3) Chillies powder:  
Obtained by crushing cloves.
- 4) Chillies extract :  
Obtained by soaking the chillies in alcohol.

### Pharmacology:

Although the precise mechanism of action of Axsain (capsaicin) is not fully understood, current evidence suggests that capsaicin relieves neuralgia pain by depleting and preventing reaccumulation of substance P in peripheral sensory neurons. Substance P is thought to be the principal chemomediator of pain impulses from the periphery to the central nervous system. Initial release of substance P from sensory neurons is believed to be responsible for burning or stinging sensations experienced by some individuals. Such unpleasant sensations may be reduced or prevented by Axsain's patented Lidocare™ vehicle system which contains lidocaine.

While a single dose of capsaicin activates pain, inflammation and hypersensitivity, repeated (long-term) application in appropriately formulated product forms leads to desensitization, analgesic, and anti-inflammatory activity. Capsiacin-induced analgesia and desensitization has been explained on the basis of neuropeptide release and depletion, selective targeting of C fibers in the pain pathway, and activation of the vanilloid receptor type 1. Extracts of five species of hot peppers showed in vitro antimicrobial activity. Lipid peroxidation and

bacterial counts were inhibited by the addition of hot or sweet peppers to beef patties. Antioxidant activity of capsicum is attributed to capsaicin. In vitro inhibition of bacteria and platelet aggregation by capsaicin has been associated with in vitro fluidization of lipid membranes. Gerbils fed a high-cholesterol diet containing capsicum oleoresin showed reduced serum levels of cholesterol and triglycerides. High oral doses of capsicum in rats lowered serum glucose levels. Administered intragastrically to rats, capsaicin inhibited the formation of hydrochloric acid-induced ulcers, damage to the gastric mucosa, myeloperoxidase activity, lipid peroxidation, and hemorrhagic erosion. Capsaicin also inhibits constitutive activation of NF- $\kappa$ B in malignant melanoma cells and when topically applied to the skin of mice.<sup>20</sup>

### Beneficial effects of chillies

#### Chillies as Beverages

Recently beverage products are emerging with capsaicin as an active ingredient.<sup>21,22</sup>–The first two capsaicin beverages to hit the market are Prometheus Springs Elixirs<sup>23</sup>–launched in 2007 and Sweet16 launched in 2011.<sup>24</sup>–It is common for people to experience pleasurable and even euphoriant effects from ingesting capsaicin. Folklore among self-described "chiliheads" attributes this to pain-stimulated release of endorphins, a different mechanism from the local receptor overload that makes capsaicin effective as a topical analgesic. In support of this theory, there is some evidence that the effect can be blocked by naloxone and other compounds that compete for receptor sites with endorphins and opiates.<sup>25</sup>

#### Chillies as Counter-irritant in rheumatism

The extract of these indigenous herbs are highly effective in rheumatism, stiff joints, bronchitis and chest colds with cough and headache. Also effective in wasting of muscles

in paresis.<sup>26</sup> It may be used as a cream for the temporary relief of minor aches and pains of muscles and joints associated with arthritis, simple backache, strains and sprains.<sup>27</sup>

### Chillies as Stomachic

A stimulating stomachic. A catalyst for all herbs. Improves circulation, aids digestion by stimulating gastric juices, stimulates the appetite, reduces inflammation, is a mild stimulant or tonic, improves metabolism, relieves gas, colds, chills, and stops bleeding from ulcers. Good for the kidneys, lungs, spleen, pancreas, heart, and stomach.<sup>28</sup>

### Chillies as Food flavourant

Dry chilli is extensively used as a spice in all types of curried species in India and abroad. Grinding roasted dry chilli with other condiments such as coriander, cumin, turmeric and farinaceous matter makes curry powder. It is also used for seasoning of egg, fish and meat preparations, sauces, chutneys, pickles, frank furters, sausages etc. Bird chilli is used in making hot sauces as pepper sauce and tobacco sauce. Mandrani is a west Indies stomachache preparations made by adding cucumber, shallot, limejuice and Madeira wine to washed fruits of bird chilli.<sup>29</sup>

### Chillies as Diabetic Neuropathy

The topical application of capsaicin cream is quite safe and very effective in the treatment of pain ordinarily observed in patients experiencing diabetic neuropathy and diabetic polyneuropathy.<sup>30</sup>

### Chillies as Elevated Cholesterol

The cholesterol-reducing properties of capsaicin have been studied by various biochemists and reported in the scientific literature. Capsaicin has been shown to help prevent cholesterol associated heart diseases

such as arteriosclerosis and its more advanced form of atherosclerosis.<sup>30</sup>

### Chillies as Heart Arrhythmias

Capsaicin reduced ventricular tachycardias and ventricular fibrillations. Capsaicin also dramatically improved blood flow to the heart. Capsaicin seems to function as a natural calcium blocker, analogous to the effect of some prescription heart drugs.<sup>31</sup>

### Chillies as Cancer

Capsicum can protect the body against some known food and beverage chemicals that can cause cancer and induce cell mutations. (When capsaicin is taken with plant chlorophyll its mutagenic properties is suppressed.<sup>31</sup>

### Stomach Ulcers

If you suffer from a peptic or duodenal ulcer, the last thing you might consider taking is hot Cayenne Pepper. This goes against everything you've ever heard about what aggravates an ulcer, the facts are that most "spicy" foods do just the opposite.

Capsicum (Cayenne Pepper) can reduce pain which serves as a local anesthetic to ulcerated tissue in the stomach and can even help to control bleeding in the stomach. Some individuals may be bothered by eating "Red Pepper" or spicy foods, these foods do not cause the formation of gastric ulcers in normal people. An interesting note is that people suffering from ulcers usually avoid Cayenne Pepper, in fact those people may actually benefit from its therapeutic action.<sup>32</sup>

Taking Capsicum may significantly reduce the risk of ever developing a peptic ulcer. A Chinese study published in 1995 stated, "Our data supports the hypothesis that the chile used has a protective effect against peptic ulcer disease."<sup>33</sup>

Another 1995 study found that Capsicum can even protect the stomach lining from aspirin induced ulcers.<sup>34</sup>

Aspirin can cause stomach ulceration in certain individuals or if taken with too little water or juice. Researchers have concluded after experimenting with human volunteers that the capsaicin content of capsicum has a definite gastro - protective effect on the mucous membranes of the stomach.<sup>35</sup> Eighteen healthy volunteers with normal gastrointestinal mucosa took chile and water followed by 600 mg of aspirin and water. The study was conducted over a period of four weeks. Endoscopy results showed that taking 20 grams of chile before the aspirin definitely demonstrated a protective action on the stomach lining.

Capsicum has the ability to rebuild stomach tissue. Capsicum has the ability to bring blood to regions of tissue at a faster rate boosts the assimilation of foods that are consumed with it. Several clinical studies support this phenomenon. It has been thought that Capsicum stimulate the release of substances which increase secretions in the stomach and intestines plus can increase an abundance of blood to the stomach and intestines.<sup>36</sup> In fact, Capsicum can increases the flow of digestive secretions from the salivary, gastric and intestinal glands

#### Contraindication:

Capsaicin topical cream is used externally to help relieve pain and discomfort caused by arthritis, fibromyalgia, bursitis, and other painful joint or muscle disorders or injuries. It can also be used to relieve itching from dermatitis or exzema.<sup>37</sup> Seek medical attention right away if any of these SEVERE side effects occur when using Capsaicin Cream:

Severe allergic reactions (rash; hives; itching; difficulty breathing; tightness in the chest;

swelling of the mouth, face, lips, or tongue); difficulty breathing or swallowing; irritation, redness, blistering, or severe or persistent burning at the application site.<sup>38</sup> Cayenne is contraindicated for individuals on ACE inhibitors, agents that reduce stomach acid, aspirin, blood-thinning medications and herbs, and theophylline.<sup>39</sup>

#### CONCLUSION

There are many claims to the benefits of chillies and its uses; it is belonging to the family solanaceae. Chillies provide widest range of physiological effects however results of some studies conducted to explore the beneficial effects of chillies were positive and some were negative. Though there are several common use and benefits, the most popular frequent use is as a spice. Chillies extract contain capsaicin as main constituents that uses in Diabetic Neuropathy, reduced Cholesterol level and Heart Arrhythmia. Chillies also used in treatment of Cancer. It is contraindicated to pregnant women, lactating mother

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