

Antioxidant potential of bitter cumin (*Centratherum anthelminticum* (L.) Kuntze) seeds in in vitro models

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BMC Complementary and Alternative Medicine 2011, 11:40doi:10.1186/1472-6882-11-40

Background

Bitter cumin (*Centratherum anthelminticum* (Willd.) Kuntze), is a medicinally important plant. Earlier, we have reported phenolic compounds, antioxidant, antihyperglycemic, antimicrobial activity of bitter cumin. In this study we have further characterized the antioxidative activity of bitter cumin extracts in various in vitro models.

Methods

Bitter cumin seeds were extracted with a combination of acetone, methanol and water. The antioxidant activity of bitter cumin extracts were characterized in various in vitro model systems such as DPPH radical, ABTS radical scavenging, reducing power, oxidation of liposomes and oxidative damage to DNA.

Results

The phenolic extracts of bitter cumin at microgram concentration showed significant scavenging of DPPH and ABTS radicals, reduced phosphomolybdenum (Mo(VI) to Mo(V)), ferricyanide Fe(III) to Fe(II), inhibited liposomes oxidation and hydroxyl radical induced damage to prokaryotic genomic DNA. The results showed a direct correlation between phenolic acid content and antioxidant activity.

Conclusion

Bitter cumin is a good source of natural antioxidants.

Spice in Curry Could Prevent Liver Damage

ScienceDaily (Oct. 30, 2010) — Curcumin, a chemical that gives curry its zing, holds promise in preventing or treating liver damage from an advanced form of a condition known as fatty liver disease, new Saint Louis University research suggests.

Curcumin is contained in turmeric, a plant used by the Chinese to make traditional medicines for thousands of years. SLU's recent study highlights its potential in countering an increasingly common kind of fatty liver disease called non-alcoholic steatohepatitis (NASH). Linked to obesity and weight gain, NASH affects 3 to 4 percent of U.S. adults and can lead to a type of liver damage called liver fibrosis and possibly cirrhosis, liver cancer and death.



"My laboratory studies the molecular mechanism of liver fibrosis and is searching for natural ways to prevent and treat this liver damage," said Anping Chen, Ph.D., corresponding author and director of research in the pathology department of Saint Louis University.

"While research in an animal model and human clinical trials are needed, our study suggests that curcumin may be an effective therapy to treat and prevent liver fibrosis, which is associated with non-alcoholic steatohepatitis (NASH)."

High levels of blood leptin, glucose and insulin are commonly found in human patients with obesity and type 2 diabetes, which might contribute to NASH-associated liver fibrosis.

Chen's most recent work tested the effect of curcumin on the role of high levels of leptin in causing liver fibrosis in vitro, or in a controlled lab setting.

"Leptin plays a critical role in the development of liver fibrosis," he said.

High levels of leptin activate hepatic stellate cells, which are the cells that cause overproduction of the collagen protein, a major feature of liver fibrosis. The researchers found that among other activities, curcumin eliminated the effects of leptin on activating hepatic stellate cells, which short-circuited the development of liver damage.

The findings were published in the September issue of *Endocrinology*.

Curry Spice Could Offer Treatment Hope for Tendinitis

ScienceDaily (Aug. 9, 2011) — A derivative of a common culinary spice found in Indian curries could offer a new treatment hope for sufferers of the painful condition tendinitis, an international team of researchers has shown.



In a paper due to be published in the *Journal of Biological Chemistry*, the researchers at The University of Nottingham and Ludwig Maximilians University in Munich have shown that curcumin, which also gives the spice turmeric its trademark bright yellow colouring, can be used to suppress biological mechanisms that spark inflammation in tendon diseases.

Dr Ali Mobasheri of the University's School of Veterinary Medicine and Science, who co-led the research, said: "Our research is not suggesting that curry, turmeric or curcumin are cures for inflammatory conditions such as tendinitis and arthritis. "However, we believe that it could offer scientists an important new lead in the treatment of these painful conditions through nutrition.

Further research into curcumin, and chemically-modified versions of it, should be the subject of future investigations and complementary therapies aimed at reducing the use of non-steroidal anti-inflammatory drugs, the only drugs currently available for the treatment of tendinitis and various forms of arthritis."

Tendons, the tough cords of fibrous connective tissue that join muscles to bones, are essential for movement because they transfer the force of muscle contraction to bones. However, they are prone to injury, particularly in athletes who may overstretch themselves and overuse their joints.

Tendinitis (or tendonitis) is a form of tendon inflammation, which causes pain and tenderness near to joints and is particularly common in shoulders, elbows, knees, hips, heels or wrists. Other examples of common tendon disease include tennis and golfer's elbow and Achilles tendinitis.

The global incidence of tendinitis is on the increase in line with the rise in aging and inflammatory diseases. It is also linked to other arthritic and rheumatic diseases such as rheumatoid arthritis or metabolic diseases such as diabetes.

The only treatment is to relieve pain and reduce inflammation and the only medicines which are effective in treating tendinitis are non-steroidal anti-inflammatory drugs (NSAIDs), such as aspirin or ibuprofen. In more serious cases of tendon injury, steroid injections can be given directly into the tendon sheath to control pain and enable physical therapy to start.

However, NSAIDs and steroids are associated with undesired side effects including stomach ulcers, nausea, vomiting, heartburn, headache, diarrhea, constipation, drowsiness and fatigue.

Consequently, there is an acute need for new treatments with fewer debilitating side effects.

This latest research centres on curcumin, a key ingredient of the spice turmeric, which has been used for centuries in traditional Indian or 'Ayurvedic' medicine as an anti-inflammatory agent and remedy for symptoms related to irritable bowel syndrome and other disorders.

More recently, studies have linked curcumin to potential uses in treating arthritis and a range of rheumatic diseases and, potentially, even as an agent to kill cancer cells directly or make them more sensitive to killing by chemotherapy and radiotherapy.

The Nottingham-Munich study used a culture model of human tendon inflammation to study the anti-inflammatory effects of curcumin on tendon cells. The main objective of the study was to observe the effects that curcumin had on the inflammatory and degenerative properties induced by signalling molecules called interleukins. Interleukins are a type of small cell-signalling protein molecules called cytokines that can activate a whole series of inflammatory genes by triggering a dangerous 'switch' called NF-kB.

The results showed that introducing curcumin in the culture system inhibits NF-kB and prevents it from switching on and promoting further inflammation.

The results follow on from another study by the Nottingham-Munich collaboration, published in the Journal of Biological Chemistry earlier this year, demonstrating that a compound found in red wine could have therapeutic potential for osteoporosis related bone loss in elderly patients, post-menopausal women and patients with rheumatoid arthritis.

The research found that resveratrol, a naturally occurring phytoestrogen found in the skin of red grapes, vines and various other fruits and nuts, inhibits inflammation in bone cells. Its effects extended to inhibiting the formation of osteoclasts, giant congregations of blood-derived cells responsible for bone degeneration, especially in osteoporosis in later life. Resveratrol prevented NF-kB from switching on to trigger inflammation.

The results suggest that resveratrol plays a pivotal role in regulating the balance between the formation of new bone and bone loss, which can lead to weak or brittle bones.



The findings are an important step in the search for new drugs to treat conditions such as osteoporosis, which are currently treated using medications including calcium and vitamin D supplements and a class of drugs known as bisphosphonates. Post-menopausal women can also benefit from hormone replacement therapy (HRT), however, it is associated with a large number of side-effects ranging from headaches to behavioural changes and acne and long-term use can increase the risk of developing uterine cancer.

Primary Component in Curry Spice Kicks Off Cancer-Killing Mechanisms in Human Saliva

ScienceDaily (Sep. 14, 2011) — Curcumin, the main component in the spice turmeric used in curry, suppresses a cell signaling pathway that drives the growth of head and neck cancer, according to a pilot study using human saliva by researchers at UCLA's Jonsson Comprehensive Cancer Center.

The inhibition of the cell signaling pathway also correlated with reduced expression of a number of pro-inflammatory cytokines, or signaling molecules, in the saliva that promote cancer growth, said Dr. Marilene Wang, a professor of head and neck surgery, senior author of the study and a Jonsson Cancer Center researcher.

"This study shows that curcumin can work in the mouths of patients with head and neck malignancies and reduce activities that promote cancer growth," Wang said. "And it not only affected the cancer by inhibiting a critical cell signaling pathway, it also affected the saliva itself by reducing pro-inflammatory cytokines within the saliva."

The study appears Sept. 15 in *Clinical Cancer Research*, a peer-reviewed journal of the American Association of Cancer Research.

Turmeric is a naturally occurring spice widely used in South Asian and Middle Eastern cooking and has long been known to have medicinal properties, attributed to its anti-inflammatory effects. Previous studies have shown it can suppress the growth of certain cancers. In India, women for years have been using turmeric as an anti-aging agent rubbed into their skin, to treat cramps during menstruation and as a poultice on the skin to promote wound healing.

A 2005 study by Wang and her team first showed that curcumin suppressed the growth of head and neck cancer, first in cells and then in mouse models. In the animal studies, the curcumin was applied directly onto the tumors in paste form. In a 2010 study, also done in cells and in mouse models, the research team found that the curcumin suppressed head and neck cancer growth by regulating cell cycling, said scientist Eri Srivatsan, an adjunct professor of surgery, article author and a Jonsson Cancer Center researcher who, along with Wang, has been studying curcumin and its anti-cancer properties for seven years.

The curcumin binds to and prevents an enzyme known as IKK, an inhibitor of kappa β kinase, from activating a transcription factor called nuclear factor kappa β (NF κ B), which promotes cancer growth.

In this study, 21 patients with head and neck cancers gave samples of their saliva before and after chewing two curcumin tablets totaling 1,000 milligrams. One hour later, another sample of saliva was taken and proteins were extracted and IKK β kinase activity measured. Thirteen subjects with tooth decay and five healthy subjects were used as controls, Wang said.

Eating the curcumin, Wang said, put it in contact not just with the cancer but also with the saliva, and the study found it reduced the level of cancer enhancing cytokines.

An independent lab in Maryland was sent blind samples and confirmed the results -- the pro-inflammatory cytokines in the saliva that help feed the cancer were reduced in the patients that had chewed the curcumin and the cell signaling pathway driving cancer growth was inhibited, Wang said.

"The curcumin had a significant inhibitory effect, blocking two different drivers of head and neck cancer growth," Wang said. "We believe curcumin could be combined with other treatments such as chemotherapy and radiation to treat head and neck cancer. It also could perhaps be given to patients at high risk for developing head and neck cancers -- smokers, those who chew tobacco and people with the HPV virus -- as well as to patients with previous oral cancers to fight recurrence."

The curcumin was well tolerated by the patients and resulted in no toxic effects. The biggest problem was their mouths and teeth turned bright yellow.

"Curcumin inhibited IKK β kinase activity in the saliva of head and neck cancer patients and this inhibition correlated with reduced expression of a number of cytokines," the study states. "IKK β kinase could be a useful biomarker for detecting the effects of curcumin in head and neck cancer."

To be effective in fighting cancer, the curcumin must be used in supplement form. Although turmeric is used in cooking, the amount of curcumin needed to produce a clinical response is much larger. Expecting a positive effect through eating foods spiced with turmeric is not realistic, Wang said.

The next step for Wang and her team is to treat patients with curcumin for longer periods of time to see if the inhibitory effects can be increased. They plan to treat cancer patients scheduled for surgery for a few weeks prior to their procedure. They'll take a biopsy before the curcumin is started and then at the time of surgery and analyze the tissue to look for differences.

"There's potential here for the development of curcumin as an adjuvant treatment for cancer," Wang said. "It's not toxic, well tolerated, cheap and easily obtained in any health food store. While this is a promising pilot study, it's important to expand our work to more patients to confirm our findings."

Finding ways to better treat head and neck cancers is vital as patients often require disfiguring surgery, often losing parts of their tongue or mouth. They also experience many side effects, including difficulty swallowing, dry mouth and have the potential for developing another oral cancer later.

The study was funded by Veterans Affairs Greater Los Angeles Health System, West Los Angeles Surgical Education Research Center, UCLA Academic Senate, the National Institutes of Health and the Veterans Administration.