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Natural Products & Their Therapeutic Intrinsic Worth

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ABSTRACT

It's well established that oxygen is essential for survival and energy generation in all-living organisms and ~5% of its inhaled part is converted into free radicals (either ROS or RNS) as a by-product of aerobic metabolism. Free radicals are also generated on exposure to sun light, X-rays, O_3, tobacco smoke, automobile exhaust, environmental pollutants, and several other physiological processes. These reactive species damage NAs, proteins, lipids, carbohydrate. that consequently affects the immune functions causing degenerative ailments. The initiation steps of oxygen induced oxidation require removal of H-atom which gets accelerated by the presence of certain metals such as Fe and Cu leading to formation of singlet oxygen. In a normal cell there is an appropriate balance between pro-oxidant and antioxidants. Increase in level of pro-oxidant as compared in antioxidant creates oxidative stress. Epidemiological studies provide convincing evidence that a diet rich in antioxidants is associated with a lower incidence of degenerative diseases. Fruits, vegetables and beverages(fruit juices, black-lemon-T, coffee, cocoa, beer & wine) are the potent sources of dietary polyphenols. People relying upon consuming traditional diets rich in soy and tea rarely bear breast, uterus and prostate cancer. Recent advances in biochemistry and molecular biology techniques providing tools for studying the antioxidant enzymes and for elucidating the mechanisms of the actions of antioxidants has been delineated in this manuscript.

Keywords: Aloe Vera, Anti-oxidants, Curry plant, Phytochemicals, Cancerous maladies: Beer, Ginger, Pepper, Coconut, Tea, Tomato

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CURRY LEAF AND ITS THERAPEUTICAL VALUES

Curry leaf (Curry tree - Murraya koenigii L spregn.), also known as curry patta or meetha neem is used mainly to improve the taste and flavours food items. It grows wild in foot hills and plains of the Himalayas from Kumaon to Sikkim. In southern India especially in TN, Kerala and Karnataka, at least one curry leaf plant is found in each homestead. A lot of potentialities are also prevalent in Jharkhand. Curry leaves which are slightly pungent, retain their flavour even after drying, and are used in salty preparations. Following constituents are contained in curry leaves: Moisture – 66.3%, Carbohydrate – 16.0%, Protein – 6.1%, Fat – 1.0%, P – 600mg, Fe – 3.1%, Nictinic acid – 3.1mg, β-carotene as vitamin-A – 2600iu/100g, vitamin-C 4.0mg/100g and a good sources of Ca. Ground curry leaves with mature coconut kernel and spices forms an excellent preserve and are recognized for their therapeutically values as have been included in Arurvedic and Unani medicines (Cadenas, 1989). Leaf, bark and root all together, are employed in the preparation of tonic inferring stomachic and carminative merits and also act as stimulant and checks vomiting. The juice of the roots is also useful in relieving kidney pain. The powdered leaf is used to aid in healing of flesh cuts. The roots and leaves are reported to cure piles. Curry leaves cooked in coconut oil, used as hair tonic too[1].

Hidden Quality: Chemical in Curry Leaf Fight Cancer

Figure 1. Curry Plant

Curry leaves don't just satiate taste buds. A new aspect to the leaves; the possibility of curing prostate cancer, has been discovered. Researchers from Santinikaten-based VBU, Kolkata's IICB and GUMC in Washington, US, have isolated mahanine – a plant derived carbazole alkaloid from curry leaves – which has caused mass deaths of prostate cancer cells through apoptosis, a type of controlled cell death mechanism. "Mahanine didn't cause death of liver cells, cardiac/skeletal muscle cells, indicating that this alkaloid selectively kills prostate cancer cells" stated Samir Bhattacharya, the lead researcher" Mahanine promises a new chemotherapeutic

option for prostate cancer treatment" stated Bikas C Paul, a co-researcher. The findings of the study were published in the journal The Prostate, 66, No. 12.

The teammates exposed LNCaP and PC3 two types of cultured human prostate cancer cells to mahanine – extracted and purified from curry leaves (Figure 1). The cancer cells were treated with 1 mg/ml, 2 mg/ml and 3 mg/ml mahanine for 1, 2 and 3 days. And by 72 hrs, at 2 mg/ml dose, mahanine reduced the viability of both types of cancer cells by 50 per cent. At 3 mg/ml dose, mahanine destroyed almost all the cancer cells within 48 hrs. Studying the effects of mahanine on PC3 cancer cells, it was found that mahanine inhibited the activity of AKT – a protein that fuels the growth of prostate cancer cells (Prakash, and Singh, 2009). It also blocked the generation of Bcl-xL – a type of protein that helps cancer cells' survive. At 60 hrs, mahanine completely abolished Bcl-xL. Reduction in the level of Bcl-xL releases a mitochondrial protein, cytochrome C. This protein activates caspase, an enzyme that further accelerates the death of cancer cells without damaging any neighbouring healthy cells. This chemical compound has also been shown to cause death of human leukaemic cells. It has been established that prostate cancer cells are more sensitive to mahanine-induced cell death compared to leukemic cells as the concentration of mahanine used were well below the concentration used to kill leukemic cells. Prostate cancer has been found to be one of the ten leading male cancer cases in India. According to population-based cancer registry, prostate cancer is on the rise in cities like Pune, Delhi, Chennai, Bangalore and Kolkata. In the US, prostate cancer is the second leading cause of death in men.

TOMATOES

In accordance with recent findings, raw tomatoes mayn't be as good as we think as eaten raw might not be so healthy. Because our digestive tract can only process a tiny amount of lycopene which is an antioxidant occurring in tomatoes. It was found that although around 75% of the whole antioxidant moieties were released, including ~ 4% of the lycopene occurring in raw tomatoes. Our digestive tract isn't capable to release the majority of lycopene and thereby make more lycopene bio-available from processed tomatoes, therefore one should opt sauces/ketchup to achieve goodness of desired antioxidant[2].

Spicing Up Fight against Some Types of Cancer: (Ginger Powder and Pepper Prevent or Slow Growth)

Ginger can kill ovarian cancer cells while the compound that makes peppers hot can shrink pancreatic tumours. Rebecca Liu, an assistant professor of obstetrics and gynaecology at the

UMCCC, and colleagues tested ginger powder dissolved in solution by putting it on ovarian cancer cell cultures. It killed the ovarian cancer cells in two different ways – through a self destruction process called apoptosis and through autophagy in which cells digest themselves, the researchers stated to a meeting of the AACR. Most ovarian cancer patients develop recurrent disease that eventually becomes resistant to standard chemotherapy, which is associated with resistance to apoptosis. If ginger can cause autophagic cell death in addition to apoptosis, it may circumvent resistance to conventional chemotherapy. Ovarian cancer kills 16,000 out of the 22, 000 US women who are diagnosed with it every year, according to the ACS. Ginger has been shown to help control inflammation, which can contribute to the development of ovarian cancer cells. In multiple ovarian cancer cell lines, it was found by a co-researcher, Jennifer Rhode that ginger-induced cell death at a similar or better rate than the Pt-based chemotherapy drugs typically used to treat ovarian cancer. A second study found that capsaicin, which makes chilli peppers hot, fed to mice caused apoptosis death in pancreatic cancer cells, stated Sanjay Srivastava of the UPSM.

BEER FIGHTS BRITTLE BONES IN WOMEN

Ladies, here's a good excuse to guzzle the next glass of beer – drinking it daily could stop bones from going brittle, revealed by the researchers of Spain (New England Journal of Medicine-Issue, August-2009). The bones of women who consume beer regularly are stronger, making them less likely to suffer from osteoporosis commonly occurring after menopause. And, the high level of Si in beer actually slows down the thinning that leads to fractures and boosts the formation of new bone, Nature Journal reported. Beer has been claimed to be one of the most important sources of Si in Western diet, researchers were quoted as saying, Besides Si, beer, is also rich in phytoestrogen, which keeps the bones healthy. Bones made up of fibres minerals, blood vessels and marrow and healthy ones are denser with smaller spaces between different parts. Women who had less than a pint a day, whom the researchers classified as light beer drinkers, fared just as well as those in the moderate bracket, suggesting that even small amounts can boost bone health[3].

MORE THAN JUST A DRINK

Coconut water – the clear liquid found inside young, green coconuts – is a cool drink to look forward to in the summer months. Sweet and nutritious, it's popular in the tropics especially in Asia and Latin America. Not just a beverage though, coconut water bears medicinal properties as used to treat diarrhoea and safe for heart. Over the years pathogenic bacteria have turned stronger

Figure 2 Coconut Fruit

at resisting commercial antibiotics. To solve this problem, scientists turned towards basic immunity providers – proteins. When a bacterium attacks, immunoglobulin (antibodies of the natural resistance system), are released which are made of proteins. Researchers around the world isolated a variety of antimicrobial proteins or AMPs from different tissues like flowers, tubers, leaves, roots and seeds. Of them, the ones isolated from common guava and black eyed pea seeds indicated significant anti-bacterial activity. Given the medicinal value of coconut water, researchers from WB and Brazil decided to explore its antimicrobial properties. Coconut water from the local markets in Kharagpur was collected and after purification, the liquid was divided into three fractions which were exposed to four bacterial strains – Escherichia coli (inhabits the human gut), Staphylococcus aureus and Bacillus subtilis (cause food poisoning) and Pseudomonus aeruginosa (turns milk and meat toxic). All three fractions displayed antibacterial activity against all the three bacterial strains. It is probably an electrostatic bonding, between the positively charged AMPs and the negatively charged substances present on the surface of the bacterial cell which kills the bacterium, the study noted. "There are three new classes of peptides with different properties," stated Octavio L Franco who led a team of researchers from the UCdeB, DF, Brazil and DBT, and SMST, IIT, Kharagpur. "They are small and stable and probably control infections which other peptides succumb to," Franco added. This report, published in the December 6, 2008 issue of Peptides, is the first description of the antimicrobial peptides in coconut water (Figure 2) found effective against pathogens. These peptides could be potential drug ingredients to generate future antibiotics[5].

ALOE VERA: THE WONDER PLANT

The Aloe vera plant has been known and used for centuries for its health, beauty, medicinal and skin care properties. In 1500 B C, Egyptians recorded benefits of this herbal plant in treating burns, infections, and parasites. African hunters still rub the gel on their bodies to reduce perspiration and their scent. The Aloe vera [Lily Family-Xeroids] is a succulent that closely resembles a cactus (Figure 3). The outside of the leaf is smooth and rubbery to touch and inside

Figure 3 Aloe Vera Leaves

is the Aloe vera gel that is so regarded. More than 240 species of Aloe have been discovered in the dry regions of Africa, Asia, Europe and America. Of the these species of Aloe, 'Aloe vera barbadensis' [also known as Lily of the Desert/ Plant of Immortality (Egyptians)/ The Wand of Heaven (American Indians)/The Burn Plant/ The Medicine Plant)] native of Africa, is the species, highly nutritious and effective medicinally than other. The name Aloe was derived from the Arabic 'alloeth' meaning 'bitter' because of the bitterness of the fluid occurred in the entire plant. The Greek scientists, 2000 years ago regarded Aloe vera as the universal panacea (a nature's silent healer). The Aloe vera leaf is a rich source of many natural health-promoting active substances and contains more than 70 essential ingredients besides ~ 96% of water, including most vitamins viz. A, E, B-complex, β-carotene and minerals viz. Zn, Cu, Mg, Mn, & P, enzymes, glycol proteins, amino acids, essential oils, gibberellins, fatty acids, polysaccharides, sterols and a recent study also researched vitamin B_{12}.

Plant based sterols are potent anti-inflammatory agents. Gibberellin, a growth factor, assists in healing. Polysaccharides, including B1-3 and B1-4 glucomannans are well known for their immune stimulating effects. At least three anti-inflammatory fatty acids contained in Aloe help stomach, small intestine and colon. These acids, naturally alkalizes digestive juices to prevent over acidity- a common cause of indigestion. It helps cleanse the digestive tract by exerting a soothing, balancing effect. A newly researched compound in Aloe, acemannan, is currently being studied for its ability to strengthen the body's natural resistance. Studies have depicted this compound to boost T-lymphocyte cells that aid immunity.Aloe vera extract is made from the inner leaf, when a leaf is cut, an orange-yellow sap drips from the open end. As a drink this bitter sap has a very strong laxative effect. Cleopatra used it as a skin care produced and also the bible mentions the benefits of Aloe. Ever since, Aloe was a first aid plant in many houses in the world. Recent researches and clinical trials have indicated even wider applications for this amazing

plant including enhancing immunity, balancing blood sugar and providing pain relief. It's added that Aloe facilitate digestion, aid in blood and lymphatic circulation, as well as kidney, liver and gall bladder functions. The juice is soothing to digestive tract irritations, such as colitis and peptic ulcers. It has been in history of this wonder plant by Native Americans for stomach & intestinal disorders including constipation, haemorrhoids and large intestine colon) problems[6,9,10].

HEALING POWER OF BLACK TEA: HOT OR COLD, GREEN OR BLACK, THIS ANCIENT BEVERAGE IS STEEPED IN HEALTH BENEFITS

Figure 4 Tea Leaves

What would the world do without tea? The writer Sydney Smith asked over 150 years ago. It's no idle question. Tea is the world's most popular drink, after water providing protection against several health threats. HEART HELPER: in a Dutch study (2002) of 4807 people, those who drank at least two cups daily had half the heart attack risk of non-tea drinkers. Also it was found in Boston that heart patients who drank two or more ups daily were 44% less likely to die over the next four years. In a recent study of US, it was indicated that tea can lower bad cholesterol levels by an average of 10 per cent. In case where dangerous cholesterol has already stuck to artery walls, flavonoids, the antioxidants in tea, are thought to prevent it from damaging the inner lining. CANCER FIGHTER: In Japan, a 1998 investigation found that drinking ten or more cups of green tea every day delayed the onset of cancer by almost nine years in women and about three in men. And a Canadian study from 1998 suggests another benefit for males: Men who drank three cups a day were 30% less likely to develop prostate cancer. BONE BUILDER: Flavonoids in tea seem to protect bones. Tea also contains certain fluoride bearing minerals and substances that check bacteria from sticking to teeth, which together help fight cavities. Green and black tea (Figure 4), are probably equally protective, stated Jeffrey Blumberg, a nutrition researcher. Even iced tea is beneficial, though it's usually more diluted. Since flavonoids break down over time, making our tea is better than buying any kind of bottled or tetra pack tea[4].

FOR HEART'S SAKE, SKIM THE MILK FROM TEA:

For years, it has been understood by us tea is good for cardiac system. But adding milk to that refreshing cuppa could destroy all the health benefits, research made it clear (Figure 5). Tests indicated that while tea helped improve blood flow by increasing the ability of arteries to relax and expand, milk completely counteracts the effect. German researchers stated the results could help explain why Britain's tea-drinking culture has had little effect on the prevalence of cardiac ailment – because most of us add milk. In the study reported in the European Heart Journal, 16 women drank half a litre of freshly brewed tea, tea with skimmed milk, or plain boiled water. Tests were performed on an artery in the forearm for two hrs afterwards. Findings revealed that drinking black tea significantly improves the ability of the artery to relax and expand – but adding milk completely blunts the effects. Supporting tests on mice, indicated that this was because tea own its own relaxes the aorta by producing NO, which promotes the dilation of blood vessels. Again the effect was blocked by milk.

Figure 5 Tea Without Milk

The findings suggest that milk proteins interacted with the tea to tea decrease the concentration of antioxidants which protect against cardiac ailment. Cardiology professor Verena Stangl, of the CHB, depicted the findings could also have implications for some varieties of cancer, against which tea has also been proved to be protective [Daily Mail, London]. Tea comes from Camellia sinensis, the only plant that makes theanine. Unique to tea, theanine is major amino acid in black, green, and oolong tea. Theanine is thought to be synthesized in the root of the plant and used by the plant to make flavanoids in the leaf. There are two types of theanine that are mirror images of each other one of these forms, L-theanine, makes up 98% of the theanine found in the tea. Theanine activates specific cells involved in the "first line of the defence", meaning cells of the immune system, which stave off the risk of viral and bacterial infections. This suggests that regular tea consumption can help support the body's immune system. Exciting recent research has indicated that theanine can play important role in the natural gentle stimulatory effects of drinking tea. Several studies have found that L-theanine stimulates α-brain waves, which are

associated with a relaxed but alert mental state of mind. Theanine appears to work quickly and seems to be most effective when someone is stressed and the mind is occupied by many thoughts. It seems to help relax the mind, allowing one to focus on the task at hand. Because theanine helps the mind stop racing, it also seems to help promote a more restful, sound sleep, because sleep is then not interrupted by random thoughts. The science of theanine is just developing and it's not known if its effect is cumulative, but it does appear that the rejuvenating effects of tea on mood, cognitive function and psychomotor performance, which cannot be solely explained by the caffeine in tea[3.7].

CONCLUSION

It's front warded that the future of natural antioxidants occurring in various veggies and fruits hold great promise to ensure a better, disease-free lifestyle for mankind by scavenging free radicals and consequently preventing mutagenic changes and associated disorders concerning to various clinical manifestations.

ABBREVIATIONS

IPGMER: Institute of Post Graduate Medical Education and Research; IICB: Indian Institute of Chemical Biology; CLs: Cutaneous Lesihmanial; WBCs: White Blood Carpuscles; NO: Nitric Oxide; H_2O_2: Hydrogen Per oxide; DDT: Dichloro Diphenyl Trichloro Ethane; CHB: CharitÈ Hospital in Berlin; NVBDCP: National Vector Borne Disease Control Programme CMEVM: Centre For Medical Entomology and Vector Management; NICD: National Institute of Communicable Diseases; AMPs: Anti Microbial Proteins; UCdeB: Universidade Catolica de Brasilia; DBT: Department of Biotechnology; SMST: School of Medical Science and Technology; IIT: Indian Institute of Technology; VBU: Visva-Bharti University; GUMC: Georgetown University Medical Center; IICB: Indian Institute of Chemical Biology; UPSM: University of Pittsburgh School of Medicine; AACR: American Association for Cancer Research; UMCCC: University of Michigan Comprehensive Cancer Center; ACS: American Chemical Society; NAs: Nucleic Acids; ROS: Reactive Oxygen Species; RNS: Reactive Nitrogen Species

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