ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 9, Issue, 03, pp.47604-47607, March, 2017

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

IVY GOURD – MEDICINAL AND NUTRITIONAL VALUES

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ARTICLE INFO

Article History:
Received 09th December, 2016
Received in revised form
05th January, 2017
Accepted 05th February, 2017
Published online 31st March, 2017

Key words:
Ivy Gourd *Coccinia Grandis (L)*,
Health Benefits,
Medicinal Uses,
Antioxidant Properties,
Nutrients.

ABSTRACT

Ivy Gourd *Coccinia grandis (L)* also known as baby watermelon or little gourd is a unique tropical plant, that is a member of the family of *Cucurmbitaceae*. It has been classified as a medicinal herb in traditional Thai and ayurvedic medicine. The fruits of *C. grandis* are known to contain active constituents like taraxerone, taxerol, amyran, lupeol and glycoside cucurbitacan B. The tender green fruits are nutritious and are good source of protein, calcium, fiber and beta carotene, Vitamin-A. *Coccinia grandis* herb lowers blood sugar levels by 20 percent in type 2 diabetics, helps in regulating body temperature during fever, used as an injection into chronic sinuses, used in decoction for gonorrhea, used to treat inflammation, dyspnea, cough, emaciation, fever with burning sensation; convulsion, syphilis pulse and flower are used in jaundice.

Citation: Harine Sargunam, J. 2017. "Ivy Gourd – Medicinal and Nutritional Values", *International Journal of Current Research*, 9, (03), 47604-47607.

INTRODUCTION

Ivy gourd *Coccinia grandis (L) Voigt* is a member of the family Cucurmbitaceae in the order Viol ales. It is a native plant of East Africa but naturalized in Asia, Australia, Pacific islands and the Caribbean islands. Ivy Gourd also called tam lueng; baby watermelon or little gourd is a tropical plant. The fruit of this plant is ovoid in shape berry type which changes green to red color when become ripe (Umamaheswari, 2008). The tender green fruits are nutritious and are good source of protein, calcium, fiber and beta carotene, Vitamin-A. The harvesting maturity of Ivy gourd is determined by the fruit color which changes from green to light green. The normal storage life is 3 to 4 days and 7 to 10 days at room and refrigerated temperature conditions respectively. The Ivy gourd turns to a pink color due initiation of ripening and loses its weight due to rapid wilting during storage (Kulkami, 2012). Chemical composition of *coccinia grandis* present the carbohydrates 12.62%, total protein 15%, water soluble protein 11.25%, lipid 4.0%, total phenol 61.92mg/100g, β carotene 70.05 mg/100g, potassium 3.38 mg/100g, phosphorous 1.15mg/100g,sodium 0.95mg/100g,iron 2.23mg/100g and calcium 3.79 mg/100g. Fruits of coccinia grandis contains, lupeol, taraxerol,β carotene, lycopene, cryptoxanthin, xyloglucen, carotenoids and β-sitosterol (Khatun *et al*., 2012).

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CULTIVATION OF IVY GOURD

Ivy gourd *Coccinia grandis* is a unique tropical plant that is a member of the family of Cucurmbitaceae. It grows well in India and Thailand as well as in tropical areas such as Hawaii. Ivy gourd has been classified as a medicinal herb in traditional Thai and ayurvedic medicine. In botanical, vegetables refers to "edible part of a plant" mostly collected or cultivated for their nutrition value for human. In India, as a large section of people are vegetarian. So, for fulfilling the dietary requirements they depend on vegetables, approximately 400 vegetable crops grown commercially (Nadkarni, 1945). India is the 2nd largest producer of vegetables in world. In India, 3% of total cropped area is used for crop cultivation. It does not fulfill the requirement of the everyday demand of day/person. Vegetables gave more yield than any other crops like rice and wheat. They also provide higher quantity of food per unit area. They also give high farm income than any other crops and high export potential compare to any other field crops. Vegetables have given a boon to processing industry as they can be processed to form diverse varieties of food like sauces, chutney, pickles etc. The maintenance of good health is essential for balance diet including the vegetable. Vegetables provide the vitamin, fiber, protein, carbohydrate and minerals like iron, potassium and sodium. Vegetables have short production cycle which allow for multiple cropping and for that reason large volume of grow worldwide on small area in compare to other crops (Lampe, 1999).

NUTRIENT COMPOSITION OF IVY GOURD

Chemical Composition of *Coccinia grandis* present the carbohydrate-12.62%, total protein- 15%, water soluble protein-11.25%, lipid-4.0%, total phenol-61.92mg/100g, vitamin C-25.55 mg/100g, β-carotene-70.05mg/100g, potassium-3.3 mg/100g, phosphorous- 1.15 mg/100g, sodium-0.95mg/100g, iron-2.23 mg/100g and calcium-3.79 mg/100 g. Fruits of *Coccinia grandis* contains steroids, saponin, ellagic acid, terpenoids, lignin, other compound like alkaloids, tannins, flavonoids, glycosides, phenols, B-amyrin acetate, lupeol, taraxerol,β, B-carotene, lycopene, cryptoxanthin, xyloglucen, carotenoids and β-sitosterol (Khatun *et al*., 2012). According to (*Sutar et al.,2010)* the extract of *coccinia grandis* contains alkaloids, carbohydrates, glycosides, tannin, saponins, flavonoids and other phytoconstituents such as cephalandrol, lupeol, sigma-7-en-3-one, taraxerone and taraxerol (Sutar Niranjan, 2010).

The bioactive compounds of fruits of *Coccinia grandis* were investigated for antibacterial activity against some pathogenic bacteria. The aqueous extracts did not show much significant activity, while the organic extracts (petroleum ether and methanol) showed the highest activity against the test bacteria. The activity was more pronounced on gram+ve organisms with Staphylococcus aureus being more susceptible and Salmonella paratyphi A being more resistant. Phytochemical analysis showed that the extracts contain alkaloids, tannins, saponins, flavonoids, glycosides and phenols, Taraxerone, taraxerol, B-carotene, lycopene, cryptoxanthin (Khatun *et al*., 2012). The crude methanolic extract of the *Coccinia grandis* plant leaves revealed the presence of phytochemicals such as flavonoids, saponins, tannins, terpenoids and Glycosides. The presence of these active ingredients of this plant was somewhat similar to the herbal tea containing, Ficus deltoidea, Orthosiphon stamineus and Stevia rebaudian. This shows that the *Coccinia grandis* plant can be also used to produce herbal tea (Sutar Niranjan, 2010). The crude extracts *Coccinia grandis* Linn was subjected for chemical group tests and identified Alkaloids, Saponins and Carbohydrate (10). β- Amyrin acetate, β-Sitosterol, β- Carotene, Cucurbitacin B, Lycopene, Lupeol, Taraxerol, Taraxerone (Kundu, 1987). *Coccinia grandis* is rich in beta-carotene also it contains a good amount of complex carbohydrates, fiber, and a vast array of vitamins B and minerals. It is also a valuable source of nutrients (11). The fruits of *C. grandis* are known to contain active constituents like taraxerone, taxerol, amyran, lupeol and glycoside cucurbitacan B (Meyer *et al*., 1982; Evans, 1989).

HEALTH BENEFITS OF IVY GOURD

Coccinia grandis herb lowers blood sugar levels by 20 percent in type 2 diabetics (Deokate, 2012). *Coccinia grandis* helps in regulating body temperature during fever. The juice of the roots and leaves is considered to be a useful in treatment of diabetes. Oil of this plant is used as an injection in to chronic sinuses. The plant is used in decoction for gonorrhea (Orech *et al*., 2005). It is used to treat inflammation, dyspnea, cough, emaciation, fever with burning sensation; convulsion, syphilis pulse and flower are used in jaundice. Fruit is applied to swelling and taken orally for disorder of blood, cure anemia, dried root powder is cathartic, the ash of root is applied for skin disease and also leaves and stems are anti plasmodia and expectorant, also useful in bronchitis. Antimicrobial activity against pathogenic bacteria and inhibited the mycelium growth and sporulation (Farukhh *et al*., 2008). It has anti cancerous activity, anti dyslipidemic, antipyretic (Bhattacharya Bolay, 2010), hepato protective activity (Moideen, 2011), anti ulcerogenic effect (Mujumder Papiya mitra *et al*., 2008) and anti-inflammatory (Ashwini *et al*., 2012). It used in the treatment of diabetes, pain, hypertension, fever, jaundice and GIT problems. used as anti diabetic herb, but it shows side effects like reduced potassium levels, increase in bleeding, allergic reaction, dizziness, GIT problems, uterine contractions. It is also used as expectorant and astringent (Gunjan *et al*., 2010).

MEDICINAL PROPERTIES OF IVY GOURD

Every part of this plant is important in medicine of as it is used in treatment of various skin diseases, bronchial catarrh, bronchitis and Unani systems of medicine for ring worm, psoriasis, small pox, and scabies and other itchy skin eruptions and ulcers (Deshpande, 2011). In many countries people use various parts of the plant to get relief from asthma and cough (Pattanayak, 2009). Oil of this plant is used as an injection into chronic sinuses. The entire plant product has been reported to be useful for the treatment of syphilis, sores and bacterial infections. The ash of the root is applied for skin complaints (Bal, 1932). The anticancer activity of the ***Coccinia grandis*** is due to the antioxidant nature. The antioxidant nature of ***Coccinia grandis*** reduces the ferrocynaide to ferrous. Hydrogen peroxide scavenged from ***Coccinia grandis*** neutralizes to water (Bulbul Israt Jahan *et al*., 2011).

ANTIOXIDANT PROPERTIES OF IVY GOURD

Flavonoids in a plant as indication of its antioxidant, antiallergic, antiinflammatory, antimicrobial and anticancer properties. However, glycoside derivatives showed very promising activity in vitro and in vivo (Keller-Juslén *et al*., 1971) and two of them, ethylidene derivative etoposide (Nakanomyo *et al*., 1986) and theylidene derivative teniposide (Van den Berg, 1997) were developed as anticancer drugs. Terpenoids and steroids are capable of preventing cancer (Raju *et al*., 2004) because of their anticarcinogenic effects (Yun *et al*., 1996). Anti-inflammatory, analgesic and antipyretic activity of fruit and leaves were studied and found to be significant. Plant contains saponins, flavonoids, sterols and alkaloids. The whole plant is traditionally used for various medicinal purposes. Leaves of this plant are used in Indian folk medicine for treatment of number of ailments including diabetes, wounds, ulcers, inflammation, in eruptions of skin, fever, asthma and cough. Earlier scientific investigation of ***C.*** *grandis* showed that the crude extract has hepatoprotective, antioxidant, anti-inflammatory and antinociceptive, anti-diabetic, hypolipidemic, anti-bacterial, and anti tussive activities (Hussain *et al*., 2010).

Methanolic extract, aqueous extract and powder of the leaves of *Coccinia grandis* were tested for antioxidant activity. Powder form and methanolic extract showed good antioxidant property whereas aqueous extract did not showed any significant activity. Methanol extracts of the fruit of *Coccinia grandis* posses the potent antioxidant activity. The methanol extract of *Coccinia grandis* contains glycoside and flavonoid. The antioxidant activity of *Coccinia grandis* is due to the reducing power ability, hydrogen peroxide scavenging potential (Deshpande, 2011).

Ethanol and methanol extract shows the antioxidant activity stem extract containing solvent petroleum, chloroform and ethyl acetate shows antioxidant activity (Ashwini *et al*., 2012) Ethyl acetate possess potent antioxidant activity than petroleum (Deshpande, 2011) *Coccinia grandis* methanol extract and leaf powder contain the antioxidant principle (Mujumder Papiya mitra *et al*., 2008).

ANTIBACTERIAL ACTIVITY OF IVY GOURD

Extract of leaves of *Coccinia grandis* for antibacterial activity against Shigella flexneri NICED, Bacillus subtilis Escherichia coli, Salmonella choleraesuis, Shigella dysenteries, and Shigella flexneri (Bhattacharya Bolay, 2010). Extract of *Coccinia grandis* shows excellent antiplasmodial activity against the Plasmodium falciparum. Extract reduces the significantly the Plasmodium berghei parasite count in mice. The methanolic extract of *Coccinia grandis* is used larvicidal activity (Rahman *et al*., 2008). Evaluated methanolic extract of *Coccinia grandis* for antipyretic activity at the doses of 100 and 200 mg/kg in yeast-induced fever. The extract showed antipyretic activity by influencing the prostaglandin biosynthesis. Prostaglandin is considered as a regulator of body temperature. *Coccinia grandis* extract contains glycosides, alkaloids, flavonoid, terpenoids, phenols and tannins. Evaluated the antifungal activity of the *Coccinia grandis* leaves extract against the Candida albicans-II, Candida tropicalis, Aspergillus Niger, Saccharomyces cerevisiae, Candida tropicalis II, Cryptococcus neoformans and Candida albicans ATCC (Bhattacharya Bolay, 2010). Extract of leaves of *Coccinia grandis* showed inhibition of growth and mutagenesis on Neurospora crassa by a gradual decrease of growth of mycelia. This result indicates that *Coccinia grandis* plant shows mutagenic effect on Neurospora crassa. Photochemical screening of *coccinia grandis* reported the presence of saponin, cardenoloids, flavonoids and poly phenols which may be attributed to anti bacterial activity. Phenolic compounds are generally noted for their anti microbial activities (Evans, 1989).

Leaves extract of Ivy gourd is effective against malarial parasites. Mosquitoes are the major vector for the transmission of malaria, dengue fever, yellow fever, filarisis etc. Ivy gourd leaf extract showed significant mutagenic effect on neurospora crass a fungus (Yadav *et al*., 2010). *(Bhattacharya et al., 2010)* evaluated the aqueous extract of leaves of *Coccinia grandis* for antibacterial activity against Shigella flexneri NICED, Bacillus subtilis Escherichia coli, Salmonella choleraesuis, Shigella dysenteries, and Shigella flexneri, Aqueous extract of *Coccinia grandis* showed more significant antibacterial activity in comparison to ethanol extract [(14)]. A polar moiety of the extract is more responsible for antibacterial properties. The chloroform extracts of *Coccinia grandis* moderately active against Sarcina lutea, Bacillus subtilis. Ethyl acetate extracts active against staphylococcus aurous. Hexane extract active against the sarcina lutea, Pseudomonas aeruginosa (Bulbul Israt Jahan, 2011). (Sivaraj *et al*., 2011) evaluated the antibacterial activity of *Coccinia grandis* leaf extract with solvents such as acetone, ethanol, methanol, aqueous and hexane against five bacterial species. Ethanol leaf extract of *Coccinia grandis* showed high antibacterial activity against S. pigeons, E. coli, B. Ceres, K. pneumonia and S. aureus (Sivaraj, 2011). Antibacterial activity of *Coccinia grandis* extract tested against the six gram positive and gram negative bacteria, ethanol extract of stem active against all except Klebsiella p and Proteus mirabilis (Farukhh *et al*., 2008; Tamilselvan *et al*., 2011). Antiinflammatory activity of ivy gourd The aqueous extract of fresh leaves produced marked analgesic activity comparable to morphine which suggests the involvement of central nervous system (Mujumder Papiya mitra, 2008). It established the anti-inflammatory activity, analgesic and antipyretic activity and, thus the ethnic uses of the plant were justified (Niazi *et al*., 2009). Fruit extract of *Coccinia grandis* by the phytoconstituents such as flavonoids, tannins, saponins, reducing sugars and triterpenoids (Chatterjee and Chatterjee, 2012). Methanolic fruit extract of the plant possesses anti arthritic and antiproliferative activities (Deshpande, 2011). Phyto-chemical study reveals that flavonoid was only present in the methanolic extract. It was observed that 60%methanolic extract of *C. grandis* produced maximum anti-inflammatory activity even more than the standard drug, diclofenac sodium after 3 hours (Chatterjee and Chatterjee, 2012).

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