

Effects of Cinnamon and Their Beneficial Content on Treatment of Oxidative Stress

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ABSTRACT

Cinnamon is an herb widely used in cooking and herbal medicine, found in Southern India and Sri Lanka, China, Indonesia, two main types of cinnamon: Ceylon and cassia. Cinnamon health effective is attributed to its characteristic components like cinnamyl alcohol, oil cinnamaldehyde, and cinnamic acid, coumarin. This herb activities including anti-allergy, antiviral, antimicrobial, antioxidant and as well as an influence when they interference with many treatments in heart disease diabetes. Many researches have been performed particularly on the activity of cinnamon in medical treatment of the popularized metabolic syndrome involving diabetes. our review article describes several recent researches has been shown that has proven the curative and preventive potential offered by cinnamon against many diseases related to oxidative stress.

Keywords: cinnamon, pharmacological effects, oxidative stress.

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INTRODUCTION

Name Cinnamon, that derivative from a Latin word related to sweet wood, acquired this name from the inner bark which consider the main part of evergreen cinnamon trees. belongs to (Lauraceae) family of plant ingdom1.Cinnamon classified as two main varieties (Gruenwald, Freder, and Armbruester 2010).The cassia , which cultivation in Vietnam, and Indonesia. And Ceylon cinnamon, which cultivation in India and Sri Lanka, (Fig. A).



Figure 1: types of Cinnamon: Ceylon and Cassia

First traditional used of Cinnamon in Food flavors as sweet spices, with pungent taste as a condiment(Kim, S.H.; Hyun, S.H.; Choung, S.Y. 2006.). The parts of the herb have similar hydrocarbons in varying proportions, its main contains ; (root) camphor, (bark) cinnamaldehyde and in (leaf) eugenol (Shen *et al.* 2012). Cinnamon evidence Several effects in medicine , scientific reports showed that CE affected as antioxidant lead to neuro protective, hepatic protective, cardio protective and gastro protective and anti-inflammatory properties (Santos and da Silva 2018) and anticancer activity , as well as in tissue repair. (Sukatta, Haruthaithanasan, and Chantaranont 2008) bark: a chief part of cinnamon: contains, CD, CE, and cinnamyl alcohol, therefore used in fight the hyperglycemia damage. In Modern herbal medicine CE has available in the word as a new supplement for obesity and diabetes millets type 2, and hyperlipidemia treatments; is

used in traditional and integrative medicine, found in form capsule or as a spice. scientific reports have supported the anti-diabetic protect by noted different molecular mechanisms, not all used clinical trials to support this treatment (Bandara, Uluwaduge, and Jansz 2012).

CHEMICAL CONSTITUENTS

Different types of cinnamon are composed mainly of different components, most notably: CD, CA, and cinnamate, and different important oils (Table 1). This oils indicated like: leaf oil of zeylanicum cinnamon and bark oil were distinguished with eugenol (Gotmare and Tamba 2019). CA oil , was found in, cinnamon cassia , its used in treatment, anti-fungal factors to stop food loses, and cosmetics (Sukatta, Haruthaithanasan, and Chantaranont 2008). Leaf oil of longepetiolatum cinnamon abundantly contain Camphor compound. Camphor is used topically to diminish pain and treats infections (Gruenwald, Freder, and Armbruester 2010).

Table 1: Percentage Chemical compound in cinnamon oils(Rao and Gan 2014).

Compound	Percentage %
Eugenol:	70.00 to 95.00%
Cinnamaldehyde:	65.00 to 80.00%
Camphor:	60.00%
Cinnamyl acetate	(42.00 to 54.00%)

TRADITIONAL

This enjoyably interesting, sweet-flavored flavor usually found in the inner brown bark of Cinnamomum trees which when dried rolls into a tubular-sticks, called as "quill." herb also stores many especially contains and nutrients (Kallel *et al.* 2019) minerals like Fe is necessary

in RBC's production. Also, K an essential component of body fluids and cell and control blood pressure and heart mechanism. Cinnamon contain Mg and CO induce enzyme work, SOD. Herb also holds of pyridoxine, pantothenic acid, niacin, and vit-A. As little as half a spoon of cinnamon daily can have good effects on digestion , glucose levels, defect system in body (Spp , 2011). A lot of doses help to improving heart disease risk, tumor and T2DM diseases. other beneficial effects are toothaches, oral infections (Hamidpour *et al.* 2015). The herb has also been used for the therapy of gastrointestinal and colonic. All this gave cinnamon importance to be used daily in all the world because of the widely herb benefits (Kumar, Kumari, and Mishra 2019).

ANTIOXIDANT

Cinnamon have antioxidant compounds : polyphenols, phenolic acid and flavonoids give the health benefits for cinnamon as antioxidants, and prevent oxidative stress in the body by its respond to free radicals and reduce damage from metabolic diseases in the body . (Abeysekera *et al.* 2019)

Many antioxidant that have been indicated in cinnamon: camphene, eugenol, salicylic acid, and epicatechin. In contemporary time, natural antioxidants are the concentrate of major interesting different studies that indicated it's effected. and fixed how it can be using there as effective foods and can block oxidative damage in the organism (Mahdi *et al.* 2018). The Extracted oil and eugenol showed very powerful activities (Rao and Gan 2014). Other study found that limit nitric oxide build-up in the blood and block fat peroxidation, the free radicals and nitric oxide can raise the danger of cardiovascular disease , brain disorders, carcinoma (Abeysekera *et al.* 2019). Studies showed the many antioxidants find in this herb help to stop harmful free radicals in the organism and blocked oxidative stress.

DIABETES

DM is disorder of glucose metabolism related for deficiency of insulin caused by an autoimmune attack on the β cells of the pancreas and insulin resistance(Kumar, Kumari, and Mishra 2019). Effect of Cinnamon represent by shown to have insulin mimetic properties because its active substances rise glucose uptake by activating IR kinase activity, auto phosphorylation of the IR, and glycogen synthase activity(Medagama 2015). Studies found how can glycemic control in diabetics by increase insulin secretion using limited doses of cinnamon (5, 10, and 20mg/kg). cinnamon doses are reduce OS and protection to β cells(Rao and Gan 2014). (Shi *et al.* 2017) also investigated the cinnamon consumption to prevention of the metabolic syndrome related to insulin resistance. Cinnamon extracts assisted inhibitor the activity of enzymes to prevent the absorption of glucose in the bloodstream when taking carbohydrate meals. New studies indicate that individuals with T2DM when dosage supplementing with cinnamon extract was had positive treatment indicators with blood sugar markers(Zaidi *et al.* 2015).

Another research detection the amount of GLUT4 receptors also IR, and IRs increase when taking cinnamon(Couturier *et al.* 2010), this lead to facilitating glucose entry into cells. indicate that CE helps the translocation to the plasma membrane of the GLUT 4 in peripheral tissue by dose-dependent method(Kumar, Kumari, and Mishra 2019). demonstrated an identical

impact include a raise the membrane translocation of GLUT4 from 42.8 % to 73.1 % in cinnamon treated animal when compared to controls(Ranasinghe *et al.* 2017). From results can be focused on the effects of insulin and its mechanism in the body to achieve the therapeutic prospect for CE as similar drug for the treatment of diabetes mellitus.

ANTI-ALLERGY

Cinnamaldehyde showed a therapeutic effect on allergic diseases regarding mucosal cells, (Zaidi *et al.* 2015). Study showed the bioactive of trans-CA that extracted from cinnamon this major compound effect on allergen-specific immune responses. The results of the study showed that Cinnamaldehyde, significantly inhibited dendritic cells maturation and subsequent allergen-specific T cell proliferation as well as Th1 and Th2 cytokine production(Ose *et al.* 2020)

ANTIMICROBIAL ACTIVITY

Several anti-bacterial treatments have been identified from natural sources such as fungi, algae and animals .Researches has focused on different plant sources and their biologically active compounds that have a therapeutic effect on bacterial infection (Sleha *et al.* 2014). Study indicate to antibacterial activity of cinnamon oil Separately and possible effect to interference between cinnamon and different antibiotic precisely streptomycin, ampicillin, and chloramphenicol Where it is observed antibacterial effect against *S. aureus*, , *P. aeruginosa*, and *E. coli* (Kumar, Kumari, and Mishra 2019).

Inter incorporation of admixture CE with ampicillin against *Escherichia coli* and *Staphylococcus aureus* shown good effects against bacteria stains. The incorporation of CE and ampicillin can be applied as an alternative drug, thereby lowering the minimum effective dose of the medication, lead to decrease their bearable counteractive effects and the price of medication(Nabavi *et al.* 2015). Others explain that CA could be used in the food industry because it has an effective and safe anti-bacterial effect. the incorporation antibacterial activity of CA against 13 food-borne isolates were evaluated by a checkerboard assay(Abdalla 2018) . From the above it was found , CA is the main antimicrobial in cinnamon oil and bind to proteins cause blocking the action of amino acid decarboxylases(Sleha *et al.* 2014).

ANTIFUNGAL EFFECT

Cinnamaldehyde main component oil in leaf of cinnamon have antifungal activity compare with the other compositions for cinnamon it has the ability to prevent the growth of fungi. (Nabavi *et al.* 2015)The study indicated 10 micro from oil inhibit by 100% the growth of *C. gloeosporioides*, *L. theobromae* and *R. stolonife*, while in both *A. alternata*, *A.niger* and *P.viticola* oil not reduced growth (Kumari and Kumar 2019).

CARDIOVASCULAR DISEASES

A contemporary study notifies into compounds, CD, and CA, isolated from cinnamon and their activity toward (IHD)(Wavreil and Heggland 2020). Another studies (Mohammed, Kadhim, and Abbood 2020)(Song *et al.* 2013) was investigated the Therapeutic effect of (CA) and (CD) as cardio protective in a rat model of ischemic myocardial disadvantage. This therapeutic efficacy is due to anti-oxidative and anti-inflammatory properties. the result has shown cinnamic aldehyde and cinnamic acid

reduce damage occur by myocardial ischemia, decreased levels of lactate dehydrogenase, interleukin- 6, and creatine kinase, and increased serum NO activity. and increased superoxide dismutase activity (Kadhim, Mohammed, and Abbood 2020). Studies demonstrated that compounds extracted from bark cassia had cardio protective effects and anti-oxidative properties, as well as might have contributed to their cardio protective drugs to reduce side effect for heart treatment.

ANTICANCER

Drugs used to treat cancer have shown Side effects and health complications. Therefore, recent research has focused on plant medicine and the therapeutic effect of herbal extracts alone or synergy with common cancer drugs that applied in tumor treatment. CE have proven wide effective treatment ability after being linked to chemical drugs for cancer. The death of cell plays main roles in the initiation and progression of tumor. CE, as a therapeutic factor, through affecting many apoptosis-related pathways in cancer cells (Sadeghi et al. 2019)(Dutta and Chakraborty 2018). Reported that CA inhibits the the production of tumor necrosis factor alpha stimulate (IL-8) in cells . This repression give additional support to the existing role of CD as a potential anti-tumor factor (Ranasinghe et al. 2013). Complementary treatments from CE have antitumor properties have been noticed owing to their activity in interfering with the oncogenic molecular pathways.

CONCLUSION

Modern and traditional medicinal beside the biochemical and pharmaceutical system is especially based on Aromatic plants because it does not have harmful side effects as well as being accepted by most people as a spice that can be used daily in food, so cinnamon, in all forms of, oil, bark powder, extracts, phenolic compounds, flavonoids or its isolated components, has been shown to possess different biological and pharmacological actions for the treatment of various diseases, antimicrobial and antioxidant activities may occur through the direct action on oxidants or microbes, whereas anticancer , anti-inflammatory, and antidiabetic activities occur indirectly via receptor-mediated mechanisms. Further, it is necessary to improve clinical evidence for the traditional uses of this herb against inflammatory, tumor and, heart disorders, and brain disorders. Although several researchers identified various compounds extensive research is still needed to explore the mechanism and function of other compounds that have bio treatment which can be used to cure several diseases.

CONFLICTS OF INTEREST

No interest conflicts are there.

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