



Eureka Herba Indonesia

Journal Homepage: <https://eurekabiomedical.com/index.php/EHI>

The Potential of Cinnamon as Anti-Depressant

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ARTICLE INFO

Keywords:

Depression
Anti-depressant
Anti-inflammatory
Alternative
Cinnamon

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All authors have reviewed and approved the final version of the manuscript.

<https://doi.org/10.37275/ehi.v2i2.19>

ABSTRACT

Depression is a feeling of loss of interest or pleasure, sadness, feelings of guilt or inferiority, disturbances in sleep or appetite, feelings of tiredness, and poor concentration and the desire to end life. In Indonesia, according to the Indonesian Ministry of Health in 2018, the prevalence of depressive disorders in Indonesia is 6.1%. Based on the 2013 Riskesdas report, the prevalence of suicide in Indonesia is mostly carried out by women, which is around 0.8% compared to men, which has a prevalence of 0.6%. Until now, the first line of depression therapy is the Serotonin Re- Uptake Inhibitor (SSRI) group. Although this drug is effective in improving symptoms of depression, this drug can cause several side effects such as insomnia or drowsiness, weight gain, and sexual dysfunction. Therefore, we need an alternative medicine that can replace conventional medicine which has less side effects. Cinnamon is one of the many plants found in Indonesia which is believed to have the potential to overcome various diseases. Based on previous research, there are many active components contained in cinnamon that have anti-depressant effects. Active components such as Phenol, Cinnamaldehyde, Turmerone, Proanthocyanidin and Linalool as well as Eugenol can provide anti-depressant effects through anti- inflammatory prevention.

1. Introduction

Depression is a feeling of loss of interest or pleasure, sadness, feelings of guilt or inferiority, disturbances in sleep or appetite, feelings of tiredness, poor concentration, and the desire to end life. Depression can be prolonged or recurrent, which can interfere with a person's ability to function at work or school, or in daily life.¹⁷

In 2017 it is estimated that 200 million people in the world suffer from anxiety or about 3.6% of the world's total population, on the other hand, there are 322 million people suffering from depression, or around 4.4% of the world's population.¹⁷ In Indonesia, according to the Indonesian Ministry of Health 2018, the prevalence of depressive disorders in Indonesia is 6.1%. Based on the 2013 Riskesdas report, the

prevalence of suicide in Indonesia is mostly committed by women, which is around 0.8% compared to men who have a prevalence of 0.6%.¹³

The main symptoms of depression that are most often found are depressive effects, loss of interest and excitement, and reduced energy leading to increased fatigue and decreased activity.^{14,16} In general, depression is often associated with impaired activity of neurotransmitters such as decreased serotonin, norepinephrine, and dopamine. Chronic oxidative stress due to oxidants can cause activation of the inflammatory cascade in the brain, leading to long-term damage to neuron cells. In conditions such as inflammation, there is a decrease in the work function of neuron cells in the brain, causing a decrease in the activity of the neurotransmitters serotonin and

dopamine. Low levels of serotonin and dopamine are markers of depression.¹⁰

Until now, the first line of depression therapy is the Serotonin Re-Uptake Inhibitor (SSRI) class. SSRI antidepressants are drugs that can increase the amount of the neurochemical serotonin in the brain. Although this drug is effective in improving complaints of depression, this drug can cause several side effects such as insomnia or drowsiness, weight gain, and sexual dysfunction.¹ Therefore, there is an effort to find an alternative drug that can replace SSRI drugs as an anti-depressant with the same effectiveness, but the side effects were more slight. In addition, this alternative medicine is expected to be more easily accessible by the community.

Based on previous studies, it is known that cinnamon has an active ingredient component with anti-depressant effects. One of the important ingredients of cinnamon is Cinnamaldehyde which is a peroxisome proliferator-activated receptor (PPAR) - γ agonist. Based on study results, agonists of this molecule, such as rosiglitazone and pioglitazone, can relieve symptoms of depression and mood disorders.³ In addition, cinnamon also contains linalool and eugenol which can reduce lipid oxidation. This is important because lipid peroxidase activity can lead to the formation of free radicals, namely malondialdehyde (MDA). The presence of MDA can cause a decrease in serotonin and inhibit serotonin binding to receptors.¹² Therefore, this scientific paper was written to determine the benefits and components of the active substance in cinnamon which is useful in improving the clinical picture in depressed patients.

2. Methods

The method of research on scientific work using secondary data is sourced from literature studies. A descriptive approach was applied with data sourced from existing research articles. Search for articles in this study used the google site (www.google.com), PubMed (www.pubmed.ncbi.nlm.nih.gov), ClinicalKey (www.clinicalkey.com), ResearchGate,

(www.researchgate.net), and ScienceDirect (www.sciencedirect.com). Search using keywords such as depression, antidepressants, cinnamon, cinnamon, SSRIs, etc.

3. Results and Discussion

Depression

Depression is a feeling of loss of interest or pleasure, sadness, feelings of guilt or inferiority, disturbances in sleep or appetite, feelings of tiredness, and poor concentration, and can lead to the desire to end life. Depression can be prolonged or recurrent, which can interfere with a person's ability to function at work or school, or in daily life.¹⁷

There are several factors that can cause depression, namely genetic factors that if it is known that one parent is depressed, it can double the risk for future offspring; biological factors associated with neurotransmitter disorders in the brain such as decreased serotonin, norepinephrine, and dopamine; and psychosocial factors in the form of someone experiencing a tragic event such as losing someone or experiencing childhood trauma.^{1,4,16}

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Therapy that can be given is psychopharmaceutical and psychotherapy. The psychopharmaceutical in the first line of depression therapy is the Serotonin Re-Uptake Inhibitor (SSRI) group. SSRI antidepressants are drugs that can increase the amount of the neurochemical serotonin in the brain. SSRIs work by selectively inhibiting the uptake of serotonin that has been secreted in synapses (the gap between neurons)² SSRIs (citalopram, escitalopram, fluoxetine, paroxetine, and sertraline) generally produce fewer side effects when compared to tricyclic

antidepressants. However, there are common side effects such as insomnia or drowsiness, sexual dysfunction, and weight gain.¹

Cinnamon (*Cinnamon*)

The term cinnamon generally refers to the dry skins of *C. zeylanicum* and *C. aromaticum* which are used for the manufacture of various types of chocolates, drinks, hot candies, and liquor. Cinnamon bark, leaves, flowers, and fruit are used to prepare essential oils, which are intended for use in cosmetics or food products.⁹

The three main components of essential oil obtained from the skin of *C. zeylanicum* are trans-cinnamaldehyde, eugenol, and linalool, which according to Chericoni et al. (2005) represent 82.5% of the total composition.⁷

Cinnamon is one of the many plants found in Indonesia which is believed to have the potential to overcome various diseases. This herb has been used for generations to cure coughs, fevers, and joint pain. The main compound contained in this plant is cinnamaldehyde, which is a phenyl group. Phenolic compounds have lipophilic properties, so these compounds can penetrate the blood-brain barrier and can have an effect on nerve cells.¹⁰

Anti-depressant effect on cinnamon

There are many theories regarding the exact causes of depression. In general, depression is often associated with impaired activity of the neurotransmitters serotonin and dopamine. Neuron cells in the brain are responsible for the release of the neurotransmitters serotonin and dopamine which play an important role in emotional regulation in a person. Chronic oxidative stress due to oxidants can cause activation of the inflammatory cascade in the brain, leading to long-term damage to neuron cells. In conditions such as inflammation, there is a decrease in the work function of neuron cells in the brain, causing a decrease in the activity of the neurotransmitters serotonin and dopamine. Low levels Serotonin and dopamine are markers of depression.¹⁰

One of the active substances in Cinnamon is phenol. It is said that phenols have the ability to neutralize oxidants that cause oxidative stress, thereby reducing the occurrence of inflammatory activity in brain neuron cells. In a study conducted.¹⁰ it was found that the phenol contained in the cinnamon extract inhibited the action of the pro-inflammatory cytokine TNF- α in the brain hippocampus so that neuron cells could maintain and increase brain serotonin levels optimally.

Besides Phenol, Cinnamaldehyde is also one of the active components contained in Cinnamon. Cinnamaldehyde will be metabolized in the body and produce a metabolite, namely NaB (Sodium Benzoate Metabolite) which can increase BDNF (Brain-derived neurotrophic factor) activity which functions in the upregulation of dopamine receptor expression.^{11,12}

Studies conducted by¹⁵ show that cinnamon oil extract has active components in the form of polyphenolic compounds measured were trans-cinnamaldehyde, turmerone, and O- cinnamaldehyde diethyl acetal in high amounts. Turmerone is said to have anti-inflammatory effects via inhibition of microglia activation. Trans-cinnamadehyde has also been reported to have neuroprotective properties by suppressing the increase in inflammatory mediators such as inducible nitric oxide synthase (iNOS), cyclooxygenase 2 (COX-2), and the nuclear factor kappa B (NF- κ B) signaling pathway.

Proanthocyanidin which is one of the active substances in cinnamon also has the same function where this substance is said to have an antidepressant effect by increasing BDNF expression in the hippocampus and frontal cortex in vivo research.^{11,15} BDNF also regulates the resistance and diffraction of brain neuron cells that function in serotonin synthesis.⁸

In research conducted by¹¹ besides Cinnamaldehyde and Proanthocyanidin, Cinnamon also has active substances such as Linalool and Eugenol. Both of these active substances have the function of reducing the oxidation of lipids. Lipid peroxidase will cause the formation of free radicals

(oxidants), namely MDA (Malondialdehyde). MDA will cause oxidative stress in brain neurons which causes a decrease in serotonin and inhibits serotonin from binding to its receptors.¹⁵

Cinnamon extract is also said to have the same properties and is considered to be included in the same class as SSRI class antidepressants. Research conducted by¹⁸ showed that cinnamon extract reduced immunity in rats induced by force-induced stress by means of a tail suspension test. In addition, in previous studies, the FST (forced swim test) can be carried out to determine the class of antidepressants where the use of SSRIs did not show a decrease in immobility in the FST, and SSRI groups recently showed their effectiveness in modified FST. The same thing also happened to the cinnamon extract where the cinnamon extract did not show a decrease in immobility in the FST group. Furthermore, the cinnamon extract also had side effects similar to SSRIs when over-administered in mice. Where over administration of cinnamon extract and SSRI led to increased 5-HTP-induced head twitches in mice.

4. Conclusion

Based on the results of the above exposure, it is concluded that the active ingredient components contained in cinnamon have anti-depressant effects which can be used as an alternative treatment for depressed patients.

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