

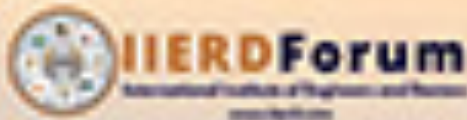


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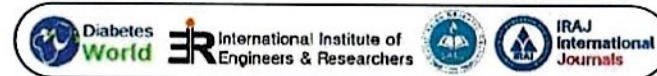
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POTENTIAL OF BIOACTIVE TEA HERBAL COMPOUNDS AS ANTIOXIDANTS AMONG *STACHYS.*, *CAMELLIA.*, & *BOUEA MACROPHYLLA GRIFFITH* (COMPARATIVE-LITERATURE REVIEW)

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Abstract - WHO in its 2014-2023 strategic program encourages to develop herbal medicine. Herbal tea is one form of herbal medicine. Herbal tea has a long history in the world and has been utilized since time immemorial for the benefit of treatment. Among the herbal tea on the popular market, including the raw materials of *Camellia* and *Stachys*. Both of these sources contain phytochemical flavonoids, saponins, tannins, phenolic and triterpenoids so that they have many benefits including antioxidants. One plant that has a similar content is *Bouea Macrophylla Griffith*. This report aims to review the potential of bioactive compounds on herbal tea on antioxidant effects.

Keywords - *Antioxidant, Bouea Macrophylla Griffith, Camellia, Herbal Tea, Stachys*

I. INTRODUCTION

Tea is consumed more than other drinks worldwide as many as 4,884 million tons of tea were produced and consumed globally in 2012. There are four main types of tea white tea, green tea (without fermentation), oolong tea (half-fermented tea) and black tea (perfect fermented tea). This drink is a hot water infusion from herbal sources such as leaves, flowers or berries that have been dried.^{1,2}

Besides plain-water, tea is the most popular and cheap drink. This non-alcoholic drink is widely consumed worldwide. At present, there are more than 3 billion people who like to drink tea as a drink in 160 countries and regions. Therefore, tea increases economic growth around the global tea market worth nearly 200 billion US dollars in 2020, and is expected to increase to more than 318 billion US dollars in 2025.^{3,4}

Tea has bioactive compounds such as polyphenols associated with an attractive aroma, good taste and health effects. Epidemiological studies strongly recommend regular consumption of plant polyphenols, as found in technology. Poswal et al (2019) in his report states that herbal tea can protect cells against disorders caused by damage to free radicals (oxidative stress) which can affect the disruption of the wound healing process by triggering cytokines in the body, when the condition takes place Chronic will trigger other disorders including aging, cardiovascular disease, cancer, diabetes, osteoporosis and neurodegenerative disease.^{1,5,6,7}

There are various types of herbal tea in the world with different raw materials. Among them are tea with raw materials for *Camelia Sinensis* and *Stachys*. which are consumed in the world because of the Medicinal Value from its secondary metabolite content. Both of these herbal teas contain phytochemicals including flavonoids, phenolic, saponins, tannin and triterpenoid.^{8,9}

One of the herbal medicine sources plants with high phytochemical content is *Bouea Macrophylla Griffith*. Sukalingam et al (2018) in his research report on secondary metabolite content in *Ramania* leaves extracted with aqueous, ethanol, methanol and N-hexan states that there are alkaloids, protein and amino acids, anthraquinones, flavonoids, saponins, phenols, tanins, sterols and triterpenoids, carbohydrates, fixed oils and vitamin C. With this fact, the leaves of this plant have the potential as the raw material for herbal tea.^{10,11}

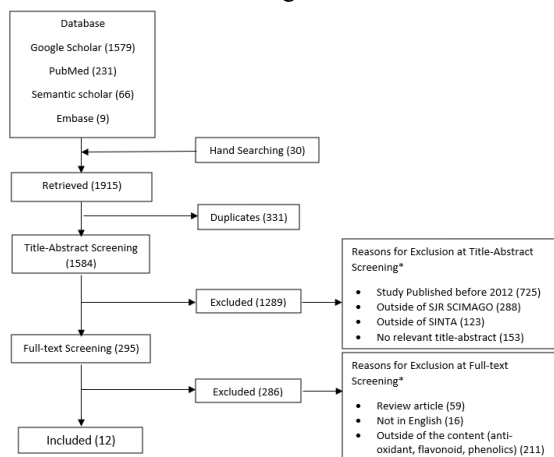
II. MATERIAL AND METHODS

The author uses the literature study writing method by collecting various articles (secondary data) in the database as the article to be studied. The collection of articles using a search engine that is adjusted based on keywords, inclusion, and exclusion. Researchers do not limit the related variables of tea specifically the antioxidant content. This research keyword is: flavonoids, phenolic, antioxidants, *Boeua, Stachys., Camellia.* Search articles using Google Scholar, Pubmed, Semantic Scholar, and Embase. Article criteria are included in the

inclusion: indexed by SJR SCIMAGO, Sinta (Indonesian Accreditation), Full Text Available, and Relevant to Discussion Related to Phenolic and Flavonoid Content in Herbal Tea which has the potential to contain antioxidants. After the article is identified based on inclusions, it will be selected through exclusion criteria, namely duplicated articles and articles that are not related to the discussion of antioxidant content in herbal tea that will be examined on Ramania leaves.

III. RESULTS

The results of the review on the search engine using Google Scholar, Pubmed, Semantic Scholar, and Embase were found as many as 1879 each Google Scholar (1579), Pubmed (231), Semantic Scholar (66), and Embase (9), and Hand Searching was carried out as many as 30. Then 1915 articles were taken. A total of 331 duplicated articles, followed by screening in the article based on the suitability of the title and abstract of the discussion of 1584 articles, excluded 1289 articles that aren't related to the discussion of antioxidant content in herbal tea that will be studied on Ramania leaves, left 295 articles that will be excluded again which then remain 12 articles according to review.



a. Phytochemical screening

Bioactive Compounds	<i>Stachys.</i>	<i>Camellia.</i>	<i>Bouea.</i>
Flavonoid	+	+	+
Phenolics	+	+	+
Saponins	+	+	+
Tannin	+	+	+
Triterpenoid	+	+	+

Description:

- + is a sign of this content
- is a sign that there is no content

From 12 articles, all of them state the bioactive components of flavonoid, phenolic, saponin, tannin, and triterpenoid potentials on the potential work of antioxidants. In contrast, the content of each component is different because it is influenced by several factors. Depends how to extraction proper and detailed bioactive composition will produce more content output, especially this technique used capillary gas chromatography (GC) and GC/Mass Spectrometry (MS) technique using Agilent GC-MSD System to see how much bioactive flavonoids and phenolics from the leaves are antioxidants.

b. Antioxidant test screening

Methods	<i>Stachys.</i>	<i>Camellia.</i>	<i>Bouea.</i>
Superoxide anion	+	+	+
DPPH	+	+	+
ABTS Cation	+	+	+
Nitric oxide	+	-	+
FRAP	+	-	-
CUPRAC	+	-	-
Chelating Effect	+	+	+

Description:

- + is a sign that has been tested on the content
- is a sign of hasn't been testing the content

From the 12 articles, *Stachys.* articles leaves all techniques has been tested for screening antioxidant potential tests. *Bouea.* articles hasn't been tested FRAP and cuprac tests. *Camellia.* articles were Nitric Oxide, FRAP (Ferric Reducing Antioxidant Power) and Cuprac (Cupric Reducing Antioxidant Capacity) had not been carried out, *bouea.* leaves have not been made by FRAP and cuprac tests. The importance of antioxidant test screening is carried out thoroughly to find how much the potential of the leaves in fighting free radicals, deeper testing with ethyl acetate, methanol and water. Although not all articles state meaningful results on antioxidant work, only meaningful in testing using chelating effect techniques.

c. Differences in the effectiveness of the antioxidant of each leaf

Leaves	IC 50	DPPH	Toxicity
<i>Stachys</i>	+	+	-
<i>Camellia</i>	+	+	-
<i>Boeua</i>	+	+	-

Description:

- + is a sign that the leaf group is greater than the group value
- is a sign that the leaf group is smaller than value

From the 12 articles, each leaf has the potential by showing a varied value in the regression test results on IC50 or by the hydrogen atomic donor method on DPPH free radicals, namely positive ogive graphs (improvement). In otherwise, it needs to be developed again about research on how to serve tea including the type of water used, the duration of maceration, and at what temperature the compounds of flavonoids and phenolic can be extracted optimally. During this time from each of these leaves the author has not found a significant value to the value of the leaf toxicity.

IV. DISCUSSION

The genus *Stachys.*, one of the biggest genus of the Labiatae Family (*Lamiaceae*) with around 300 taxa, is widespread throughout the world from the tropics to subtropics. This herb is consumed mainly as tea because of its phytochemical content. Some of these herbal species are also consumed in Europe and China as a source of carbohydrates.^{12,13}

Many *Stachys.* species are used in decoctions or infusion for the treatment of skin, stomach, ulcers, asthma, rheumatic disorders and tumors. Some members of the genus have been reported can be used as anti-inflammatory and antibacterial agents. In addition, their antianxiety, antioxidant and antinefritic nature have also been reported. In the Mediterranean and Iran regions, this species is consumed as herbal medicine and wild tea (mountain tea). Tomou et al (2020) in his report mentioned that in India *Stachys.* was taken twice a day with a dose of one teacher.¹³⁻¹⁵

Stachys. bioactive compounds show a significant value related to antioxidant capacity. This antioxidant activity makes the selling and use value in the pharmaceutical industry and the Agri-Food Industry. In phytochemical screening contained metabolites of the Flavonoid, phenolic, tannin, saponin and triterpenoid metabolites in this herb. The antioxidant activity of phenolic compounds is mainly due to its redox nature, which can play an important role in absorbing and neutralizing free radicals at the cellular level, cooling of singlet oxygen and triplets, or decomposition of peroxide. This is what underlies this herbal until now used as a source of raw material for tea.^{16,17}

Green tea plants (*Camellia.sinensis*) originated in South China and Southeast Asia, then became popular in India and Japan, and then in Europe and Russia. Malabadi et al (2022) in his report mentions that the *Camellia.dik* consumption is ideally 2 cups a day.^{18,19}

Utilization of herbal ingredients is an option as an ingredient in various treatments. WHO in the 2014-2023 strategy target directs to increase the use of natural ingredients as drug raw materials. Ramaniam (*Bouea Macrophylla Griffith*) is one of the natural ingredients that is used as herbal medicine. This plant grows in Southeast Asia, especially Indonesia, Malaysia and Vietnam.^{20,21}

Ramaniam has a fresh distinctive aroma. Lawalata et al (2015) in its report on the organoleptic quality testing of the Ramaniam aroma using a test and hedonic quality gets a value of 4.53-4.73 which means the sample likes to approach very like the aroma. The fundamental fact that this plant has many benefits including as an anti-inflammatory, antioxidant, anti-diabetic, anti-aging and anti-cancer agents. Medical value due to the content of bioactive compounds contained therein, but until now the raw material of Ramaniam leaf has never been studied as herbal tea.^{8,19,22,23}

Phytochemicals contained in Ramaniam are flavonoids, phenolic, tannins, saponins and triterpenoids. Flavonoids have the role of antioxidants, anticarcinogens, anti-inflammatory, antiviral, antitumor, can inhibit neurodegenerative diseases, and become inhibitors of lipid and fragility peroxidation. As an anti-inflammatory flavonoid agent, it can also reduce levels of Nuclear Factor Kappa-B (NF-KB). Phenol can function as an antioxidant and anti-inflammatory. Phenol compounds such as ellagic acid and mangiferin function as anti-inflammatory that can improve the immune system. Phenolic compounds have a mechanism through the capture of free radicals that can result in tissue damage so that it can trigger arachidonic biosynthesis to inflammatory mediator, namely prostaglandin and inhibit cycloxygenase enzymes so that it can act as anti-inflammatory.^{20,24-26}

The antioxidant effect of this enzyme affects wound healing. The main free radicals are produced from oxygen molecules. If the Nitrate Oxide (NO), which is produced by the synthase of the nitrate oxide, is present nearby, the superoxide anion reacts with it, producing a generation of peroxynitrite. Peroxynitrite is used to kill bacteria oxidatively to protect wound lesions as well as a strong and toxic oxidizing agent. Piao et al (2011) in its report stated that the antioxidant effects of Camelia originated from the enzyme paint, GPX and Pat are believed to improve the quality of wound healing. One of the herbal sources that contain these three types of enzymes is *Bouea Macrophylla Griffith.*^{27,28}

Reactive free radicals play an important role in different physiological mechanisms ranging from immune defense to cells and inflammation. Free radicals inhibit the wound healing process. There is more evidence that irregular free radical production causes an increase in stress in cellular structures and causes changes in molecular pathways that underlie

the pathogenesis of some relevant human disorders, such as cancer, heart disease, physiological aging, and neurological disease. Understanding the involvement of free radical stress in the pathogenesis of the disease will allow us to investigate the development of oxidative stress; A condition that occurs due to an imbalance between cellular production of oxidant molecules and the availability of appropriate antioxidant species to fight it. It is hoped that this knowledge will subsequently lead to the development of therapeutic interventions, especially herbal tea that is effective against oxidative stress.^{29,30}

V. CONCLUSION

Stachys and *Camellia* have similar bioactive components that have antioxidant activity. One of the plants that has a similar bioactive component is Ramania (*Bouea Macrophylla Griffith*) which has bioactive compounds flavonoids, phenols, tannins, saponins and triterpenoids. so that the leaves of ramania (*Bouea Macrophylla Griffith*) have the potential to be served in the form of herbal tea

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