

Antipyretic Activity Of Some Plant Species Of The Genus Hibiscus And Genus Citrus

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Abstract: Traditional medicine is one of the great benefits for the community in building health, for example, such as using medicinal plants as an alternative to traditional treatment, one of which is reducing fever. This review aims to find and evaluate the scientific literature on plants with antipyretic effects of the genera Hibiscus and Citrus. The research approach used in the review of this article is a literature review based on journals published in the last ten years (2012-2022) collected from national and international journals and conducted online using *Google Scholar*, *Pubmed*, and *NCBI* search engines. The results of the review related to plants that have antipyretic activity from the Hibiscus Genus and Citrus Genus as many as 8 plant species, namely *Hibiscus rosa sinensis*, *Hibiscus tiliaceus* L, *Hibiscus sabdariffa*, *Hibiscus schizopetalus* (MAST.) HOOK, *Citrus aurantifolia* (Christm) Swing, *Citrus hystrix*, *Citrus x aurantium* L and *Citrus assamensis*.

Keywords: Antipyretic, Genus Hibiscus, Genus Citrus

INTRODUCTION

The tropical country of Indonesia is famous for its diverse biodiversity, both on land and in the sea, many of which have medicinal properties.¹⁷ The increasing demand for health products made with natural ingredients shows people's tendency to return to nature, thus providing opportunities for those who cultivate medicinal plants to be used as traditional medicine.¹⁸ Because one of the main benefits of traditional medicine for public health and disease prevention.¹

Some plant species that can be used as a source of medicinal plants are the

Genus Hibiscus and the Genus Citrus.^{25,26} Of the two genera, several plants are believed to be efficacious as antipyretics.^{25,26} One of them is from the Hibiscus Genus, namely the Hibiscus Flower (*Hibiscus rosa sinensis* L) which contains chemical compounds such as Polyphenols, Cyanidin-diglucoside, Hibisetin, Bitter substances, Mucilage and Flavonoids.² While from the Citrus Genus namely Lime (*Citrus aurantifolia* (Christm) Swing) which contains chemical compounds such as Flavonoids, Alkaloids, Saponins, Coumarins and Tannins.³ Flavonoids are chemical components that help lower fever because they act as COX

inhibitors, which then stop prostaglandin production to stop the rise in temperature (fever).⁴

A rise in body temperature above the normal range is referred to as fever.²⁷ The normal range of body temperature is 36.5–37.5°C.⁵ Fever is the body's response to an infection caused by a foreign substance from outside.¹⁹ If the increase in body temperature exceeds 41°C, fever can potentially damage organs permanently and even result in death.⁶

When children have a fever, for example, parents are generally worried because there could be febrile seizures.²⁰ In Indonesia, febrile seizures occurred in 3-4% of children aged 6 months to 5 years in 2012-2013.²¹ Some 264 people had febrile seizures in East Java between 2015 and 2017.²² The number of toddlers who had febrile seizures in 2016 was 3,442, according to data from the Ponorogo Health Office.²² An estimated 12 million children die from febrile seizures each year, according to UNICEF (United Nations International Children's Emergency Fund).⁷ Traditional medicine is commonly used to treat fever in those living in rural areas with little access to health services.²³ One of them involves the use of plants as an alternative in reducing fever.²⁴

This review of articles aims to find and evaluate the scientific literature on plants with antipyretic effects of the genera *Hibiscus* and *Citrus*.

METHODS

The research approach used in the review of this article is a literature review based on journals published in the last ten years (2012-2022) collected from national and international journals and conducted *online* using *Google Scholar*, *Pubmed*, and *NCBI* search engines using the keywords "*Fever reducing*", "*Antipyretic activity*", "*Antipyretic test*", then followed by the Latin names of each plant of the Genus *Hibiscus* and the Genus *Citrus*. The research approach used in the review of this article is a literature review based on journals published in the last ten years (2012-2022) collected from national and international journals and conducted *online* using *Google scholar*, *Pubmed*, and *NCBI* search engines using the keywords "*Fever reducing*", "*Antipyretic activity*", "*Antipyretic test*", then followed by the Latin names of each plant of the Genus *Hibiscus* and the Genus *Citrus*. After the required journals are collected, the main journal is taken.

Furthermore, data were taken from several studies that have reviewed species including plant parts used, solvents used, compound content, effective dose or concentration used and results as fever reducers.

RESULTS

Based on the results of the literature search, several plants that have antipyretic activity were obtained from the *Hibiscus* Genus and *Citrus* Genus. There are 8 plants reported to have antipyretic activity, as listed in Table 1 and Table 2 below.

Table 1. The results of observations of antipyretic activity of the genus *Hibiscus* include plant parts used, solvents, compound content, effective dose/concentration and fever-reducing results.

No	Name Plant	Plant parts that Used	Womb compound	Solvent	Inducer	Concentration/ Effective dosage	Result
1	<i>Hibiscus rosa sinensis</i> L. (Kembang sepatu) ²	Flower	Polyphenols, Cyanidin diglucoside, Hibisetin, Bitter Substances, Mucilage and Flavonoids	Aquadest	DPT-HB-Hib Vaccine	30%	The antipyretic effect of hibiscus infusion is 30% less able to lower the temperature (37.89°C) than that of paracetamol (37.7°C).
2	<i>Hibiscus tiliaceus</i> L. (Waru) ⁸	Leaf	Flavonoids, Saponins, Phenol	Ethanol	DPT-HB-Hib Vaccine	10%	The antipyretic effect of 1% waru leaf ethanol extract can reduce body temperature equivalent to paracetamol
3	<i>Hibiscus sabdariffa</i> (Rosella) ⁹	Flower	Flavonoids, alkaloids, β sitosterol, anthocyanin, citric acid, cyanidin 3 rutinose, delphinidin, and galactose	Ethanol	DPT-HB-Hib Vaccine	250 mg/kgBB and 500 mg/kgBB	Rosella extract doses of 250 mg/kg and 500 mg/kg have antipyretic effects because they can lower the temperature (37.05 °C) as before induction.
4	<i>Hibiscus schizopetalus</i> (MAST.) HOOK ¹⁰	Flowers and Leaves	Flavonoids	Methanol	Yeast	50 mg/kgBB, and 200 mg/kgBB	The antipyretic effect of a flower extract dose of 50 mg/kg BB can reduce temperature (36.88 °C) while a leaf dose of 200 mg/kg BB can reduce temperature (37.03 °C) which is equivalent to aspirin (37.46 °C).

Table 2. The results of observations of antipyretic activity of the citrus genus include plant parts used, solvents, compound content, effective dose/concentration and fever-reducing results.

No	Name plant	Part plant that Used	Womb compound	Solvent	Inducer	Concentration/ Effective dosage	Result
1	<i>Citrus aurantifolia</i> (Christm) Swing (Lime) ³	Fruit peel	Saponins, Tannins, Alkaloids, Flavonoids, and Coumarins.	Aquades, N-hexane, ethanol	DPT-HB-Hib Vaccine	0,14%	The n-hexane fraction of lime peel has an effective concentration of 0.14% because it can lower the paracetamol equivalent temperature (37.01°C).
2	<i>Citrus hystrix</i> (Kaffir lime) ¹¹	Leaf	Flavonoids	Ethanol	Peptone 5%	5%	At 120 minutes, an effective concentration of 5% lime leaf extract was able to restore the temperature to pre-induced levels (35.7°C).
3	<i>Citrus aurantium</i> L (Orange) ¹²	Fruit peel	Flavonoids	Ethanol	Peptone 5%	1%	The antipyretic effect of 1% sweet orange peel ethanol extract can reduce the temperature (37.00°C) equivalent to paracetamol (37.00°C).
4	<i>Citrus assamensis</i> ¹³	Leaf	Alkaloids, Phenols, Phytosterols, Tannins, Glycosides, Saponins and Flavonoids.	Methanol, ethanol, chlorophome	Yeast	100 mg/kgBB and 200 mg/kgBB	<i>C. assamensis</i> extract can lower the temperature at doses of 100 mg/kg and 200 mg/kg, almost the same as paracetamol.

Some plants that have antipyretic activity and their mechanism of action

The search results related to plants that have antipyretic activity from the Hibiscus Genus and Citrus Genus as many as 8 plant species including *Hibiscus rosa sinensis* L., *Hibiscus tiliaceus* L., *Hibiscus sabdariffa*, *Hibiscus schizopetalus* (MAST.) HOOK, *Citrus aurantifolia* (Christm) Swing, *Citrus hystrix*, *Citrus x aurantium* L. and *Citrus assamensis*.

Over the years, experimental animal models have contributed to several

scientific discoveries.²⁸ Animal models serve as substitutes, and not all models are identical to the subject being represented.²⁸ A series of in vivo experiments using experimental animals, therefore animal models that correspond to human circumstances or diseases are needed to obtain a picture of patterns similar to humans.²⁸ Therefore, an inducer is needed to make the test animal feverish. Therefore, many inducers that are often used in antipyretic research will be discussed, including:

1. Yeast induction is an induction used to raise body temperature because the immune system considers microorganisms in yeast as foreign objects that can increase body temperature (fever).¹⁴
2. DPT-HB-Hib Vaccination Induction is a vaccine containing Diphtheria, Tetanus, and Whole-cell Pertussis (DTwP) antigens. Fever is a common side effect of immunizations.¹⁵
3. Peptone induction is a protein commonly called pyrogen, but the pyrogen can directly change the temperature regulation in the hypothalamus which can cause fever.¹⁶

The existence of antipyretic activity is thought to be due to the content of secondary metabolites found in each of these plants that contribute to reducing fever such as flavonoids²⁹, alkaloid³⁰, and saponins.³¹ Flavonoids act as cyclooxygenase (COX) inhibitors, and flavonoids cause prostaglandin synthesis, which has implications for inflammation and a rise in body temperature.^{2,29} Fever will occur if prostaglandins are not inhibited.² While alkaloids can inhibit the COX enzyme the formation of prostaglandins as mediators of reactions to increase body temperature will be inhibited.³⁰ Saponins in lowering body temperature are thought to be through the inhibition of bonds between exogenous pyrogens that enter the body at their receptors.³¹

CONCLUSION

Based on the findings of the literature search, it can be concluded that eight types of plants have antipyretic activity, each with a different effective dose or concentration, including *Hibiscus rosa*

sinensis L., *Hibiscus tiliaceus* L., *Hibiscus sabdariffa*, *Hibiscus schizopetalus* (MAST.) HOOK., *Citrus aurantifolia* (Christm) Swing., *Citrus hystrix*, *Citrus x aurantium* L., *Citrus assamensis*.

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