



Beneficial Effect of *Mesona palustris* BL: A Review on Human and Animal Intervention

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Abstract

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BACKGROUND: Black Cincau (*Mesona palustris* BL) has been used widely as a complementary and alternative therapy in East and Southeast Asian regions due to its potent antioxidant activity and proven health benefits. It is traditionally used to treat various diseases such as antihypertensive, fever, and anti-diarrhea. Some studies to explore the function of Black Cincau were carried out on animal and humans, but publications regarding, it are still limited.

AIM: This review emphasizes the beneficial effect of *M. palustris* BL. In addition, this review corroborates the pharmacological basis for the various health benefits, traditional, and medicinal applications of *M. palustris* BL.

METHODS: All the available information of Black Cincau (*M. palustris* BL) was collected from electronic databases such as PubMed, Google Scholar, and ProQuest from 2011 to 2020. This literature review suggests that *M. palustris* BL has a beneficial effect. All Black Cincau (*M. palustris* BL) available information was collected from electronic databases such as PubMed, Google Scholar, and ProQuest from 2011 to 2020.

RESULT: This literature review suggested that *M. palustris* BL has a beneficial effect. Researchers have proven in preclinical models that *M. palustris* BL is pharmacologically active as an antioxidant and can reduce cholesterol, blood glucose, immunomodulatory, and gastrointestinal healthy.

CONCLUSION: Several preclinical studies on *M. palustris* BL have been carried out, but the application of the effectiveness of *M. palustris* BL in humans still needs to be developed to provide the pharmacological basis for the various health benefits, traditional, and medicinal applications of *M. palustris* BL.

Introduction

Indonesian black grass jelly goes with the Latin name *Mesona palustris* BL and is well known as *Jaggelan*. This plant is widely available in various regions in Indonesia as it does not require special maintenance; thus, its cultivation is very easy [1]. Since a year ago, traditional Indonesian people have used "black cincau" for health. Several studies in the past 10 years reported that Black Cincau (*M. palustris* BL) could be used to treat diarrhea, hypertension, diabetes, and cholesterol reduction.

Many studies on the bioactivity of black cincau (*M. palustris* BL) in animals have been carried out. However, its application to humans still needs to be developed. In addition, research reports on the potential of black cincau (*M. palustris* BL) for health are still limited. This review emphasizes the beneficial effect of *M. palustris* BL. In addition, this review corroborates the pharmacological basis for the various health benefits, traditional, and medicinal applications of *M. palustris* BL. *M. palustris* BL has the highest antioxidant activity

compared with *Cyclea Barbata* Miers and *Premna Parasitica* Blume [2].

The results of the phytochemical identification conducted by Farida and Vanoria [2] reported that *M. palustris* BL extract contained alkaloids, flavonoids, saponins, triterpenoids, steroids, and tannins, while the phytochemical test conducted by Hendratama *et al.* [3] on phenol content, flavonoids and tannins are shown in Table 1 below:

Based on Table 1, the phenol and tannin content increases at a solvent ratio of 22–24 mL/g with a temperature of 94–100°C and decreases at a solvent ratio of 18–20 mL/g [3]. Meanwhile, the flavonoid content increases at a solvent ratio of 18 mL/g at a temperature of 100°C

The results of the response surface methodology analysis reported that the highest phenol, tannin, and flavonoid content was at extraction conditions with a temperature of 94–100°C with a solvent ratio of 23–24 mL/g and the highest phenol, tannin, and flavonoid content was at the lowest condition at extraction conditions with a temperature of 80–84°C with a solvent ratio of 19–21 mL/g [3].

Table 1: Amount of phenol, tannin, and flavonoid toward Changes of temperature and solvent ratio

Solvent ratio (mL/g)	Temperature (°C)	Phenol (mg GAE/mL)	Tannin (mg GAE/mL)	Flavonoid (mg Qc/mL)
18	100	0.06586	0.03957	0.14347
20	100	0.06390	0.03817	0.12109
22	100	0.06915	0.04113	0.11254
24	100	0.07502	0.05008	0.13479
24	90	0.05910	0.04442	0.12902
24	80	0.06203	0.03678	0.10193

Hendratama et al. (2020)^[3]

Methods

All the available information of Black Cincau (*M. palustris BL*) was collected from electronic databases such as PubMed, Google Scholar, and ProQuest from 2011 to 2020 using the keyword "black Cincau (*M. palustris BL*).". The inclusion criteria included original or experimental research using Black Cincau (*M. palustris BL*) in human or mice and physiology or biomarker of research sample evaluated as outcome research (Figure 1).

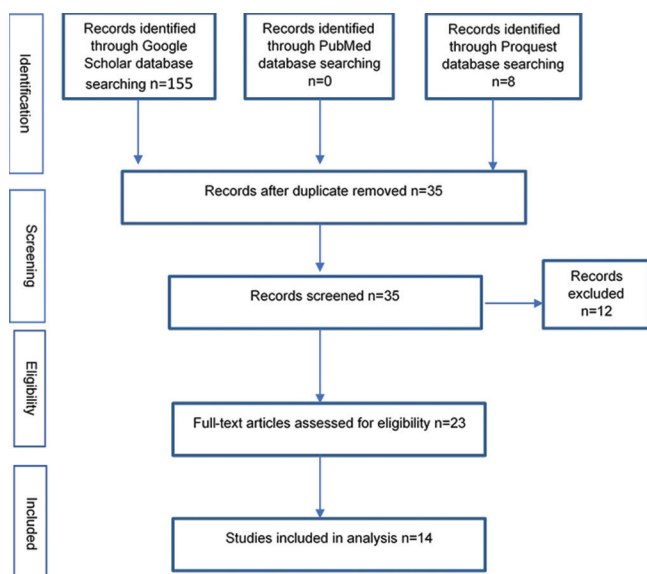


Figure 1: Prism Diagram

Results

The review results are shown in Table 2.

Discussion

Black grass jelly (*M. palustris BL*) contains phenols, tannins, and flavonoids [3]. The results of the antioxidant activity test of the methanol extract of black grass jelly leaves showed an IC₅₀ value of

32.58 µg/mL [2]. Phenol and flavonoid compounds in black grass jelly contribute to antioxidant activity and scavenging effects on free radicals. Phenolic compounds are bioactive components that have high antioxidant activity naturally found in vegetables and fruits. Phenolic compounds are included in components of bioactive compounds found in black grass jelly and red ginger plants. Phenol is a compound characterized by having one or more hydroxyl groups on an aromatic ring.

Many derivatives of phenolic compounds occur naturally as flavonoids, alkaloids, tannins, and other phenolic compounds. Flavonoid compounds are the largest phenol group in the world. Flavonoids are antioxidants and have been used as a component of pharmaceutical raw materials.

Phenol has acidic properties, which is easily oxidized, volatile, sensitive to light and oxygen, as well as antiseptic. The phenol levels will decrease, among others, by washing, boiling, and further processing to make products ready for consumption. The antioxidant effect that is found in many plants is due to the presence of phenolic compounds such as flavonoids and phenolic acids. Phenolic compounds have the effect of antioxidant because it has a hydroxyl group that is substituted at the ortho and para -OH and -OR groups positions. The antioxidant activity is directly proportional to the total phenol, the higher the phenol content in a material the higher its activity as an antioxidant [1].

Considerable evidence among the results of these animal studies has shown that *M. palustris BL* has antioxidant activity. It suggests that the antioxidant effects of *M. palustris BL* are universal as it has been observed in hypertension, hypercholesterol, and excessive physical exercise mice model. The antioxidant properties of *M. palustris BL*, most likely, contribute to its immune modulating activity. This attribute may also be at least partly responsible for the anti-inflammatory activity of *M. palustris BL*. The relationship among inflammation, the immune system, and reactive oxygen species (ROS) is well established in scientific literature. Leukocyte release proinflammatory cytokines and ROS which, in turn, cause an oxidative burst by NADPH oxidase. The antioxidant mechanism induced by *M. palustris BL* appear to be involved, to some degree, all of the effect reported in mice intervention studies. It is very likely this property of *M. palustris BL* that is central to its observed effects on hypertension, high cholesterol, and excessive physical exercise [3], [14], [15].

The aqueous extract of black grass jelly is immunomodulatory with increasing levels of IFN-γ and immune surveillance components (NK cells, cytotoxic T cells (CD8+), and macrophages) in mice induced by benzo(a)pyrene. Black grass jelly water extract can prevent carcinogenesis in mice induced by benzo(a)pyrene. This is also supported by the occurrence of apoptosis in mice undergoing carcinogenesis. Several bioactive components of black grass jelly such as phenols, flavonoids, -sitosterol, stigmasterol, and caffeic

Table 2 : Summary of Beneficial Effect of *Mesona palustris* Bungur leaf

Serial number	Author	Method		Result	Data base
		Study design	Material form		
1	Widyaningsih and Dhesti (2014) ^[4]	<i>In vivo</i>	Liang tea with a dose of 3.6 ml and 7.2 ml	Cholesterol decreased in the amount of 35.25% at 3.6 ml and 52.81% at a dose of 7.2 ml liang tea HDL increased until 58.60% at 3.6 ml and 52.74% at a dose of 7.2 ml liang tea	Google scholar
2	Widyaningsih and Amelia (2014) ^[6]	<i>In vivo</i>	Instan tea dose 0.13 g/200 g BW and 0.25 g/200 g BW and extract dose 0.13 g/200 g BW	Cholesterol decreased in the amount of 50.01% at a dose of 0.13 g/200 g BW Triglicerida decreased in the amount of 40.44% at a dose of 0.13 g/200 g BW LDL decreased in the amount of until 73.06% at a dose of 0.13 g/200 g BW HDL increased in the amount of 58.60% at a dose of 0.13 g/200 g BW	Google scholar
3	Widyaningsih and Sari (2014) ^[6]	<i>In vivo</i>	Supplement derived from <i>M. palustris</i> at dose 90 mg/kg BW and 135 mg/kg BW	Decreased MDA Increased SOD Inhibition of ALT and AST levels Significantly reduced liver damage	Google scholar
4	Handayani et al. (2017) ^[7]	<i>In vivo</i>	Effervescent powder at dose 126 mg/200 g BW, 252 mg/200 g BW, and 378 mg/200 g BW	Total cholesterol plasma Decreased in the amount of 18.42% at a dose of 378 mg/200 g BW HDL decreased in the amount of 22.25% at a dose of 126 mg/200 g BW LDL decreased in the amount of 27.25% at a dose of 126 mg/200 g BW	Google scholar
5	Widyaningsih et al. (2015) ^[8]	<i>In vivo</i>	Extracts	<i>M. palustris</i> extract at a dose 21.6 mg/200 g BW had same effect with glibenclamide to decreased blood glucose	Google scholar
6	Zahra et al. (2017) ^[9]	<i>In vivo</i>	Glibenclamide and <i>M. palustris</i> extracts	Significant reduction of blood glucose level	Google scholar
7	Husain (2018) ^[10]	<i>Human</i>	<i>M. palustris</i> BL and honey	Significantly higher pancreatic β cell count Reduced the epigastric pain scale	Google scholar
8	Safitri and Widyaningsih (2014) ^[11]		Jelly drinks derived from <i>M. palustris</i>	Decreased duration of loose stool production Better consistency and feces weight in shorter duration comparable to loperamide	Google scholar
9	Widyaningsih (2012) ^[12]	<i>In vitro</i>	Water extracts of <i>M. palustris</i>	The water extract of black cincau at low concentrations (19.53–156.25 μ g/ml) had highest anticancer activity	Google scholar
10	Widyaningsih et al. (2012) ^[13]	<i>In vivo</i>	Water extracts of <i>M. palustris</i>	At dose 1000 mg/kg BW of Water extracts of <i>M. palustris</i> able to inhibit carcinogenic until 57% and Increased IFN- γ , CD8+ , and NK cells	Google scholar
11	Widyaningsih et al. (2017) ^[13]	<i>In vivo</i>	Instant tea powder of <i>M. palustris</i> , <i>P. amaryllifolius</i> , and <i>C. verum</i>	At dose 85.58 mg/kg BW of Instant tea powder of <i>M. palustris</i> , <i>P. amaryllifolius</i> , and <i>C. verum</i> able to increased IFN- γ , macrophages, CD8+, and NK cells	Google scholar
12	Rizkia (2017) ^[14]	<i>In vivo</i>	Moist Noodle of <i>M. palustris</i>	Decreased MDA levels and increased SOD levels	Google scholar
13	Tarnajaya et al. (2018) ^[15]	<i>In vivo</i>	Extract leaf of <i>M. palustris</i> BL	Increase SOD levels at a dose of 54 mg/200 g BW	Google scholar
14	Widinugroho and widyaningsih (2014) ^[16]	<i>In vivo</i>	Supplement derived from <i>M. palustris</i> and BL	Decreased blood pressure in the amount of 32.27% at a dose of 21.6 mg/200 g BW Decreased blood MDA levels in the amount of 86.85% at a dose of 21.6 mg/200 g BW Supplement derived from <i>M. palustris</i> and BL extracted with ethanol	Google scholar

M. palustris: *Mesona palustris*, *P. amaryllifolius*: *Pandanus amaryllifolius*, *C. verum*: *Cinnamomum verum*, BL: Bungur leaf, MDA: Malondialdehyde, SOD: Superoxide dismutase, IFN: Interferon

acid are thought to have additional mitogenic effects by increasing the secretion of immunoglobulin G [4].

Ethanol extract and water extract from black grass jelly have a hepatoprotective effect from hepatotoxic attack in rats induced paracetamol with a decreased levels of SGOT, SGPT, and ALP, presumably due to the property of antioxidants. Ethanol and water extracts from black grass jelly reduce reactive free radicals that has the potential to damage membranes and increase the activity of hepatic antioxidant enzymes. In addition, it is suspected that there is a hydrocolloid or gum component contained in gelling component [8].

The decreased of blood pressure mechanism of black grass jelly, which is with phenol will donate one of the atoms to be able to bind reactive compounds that can affect blood pressure. Therefore, apart from phenolic compounds, potassium is thought to be included in the total antioxidants in lowering blood pressure. In both drinks, the compound phenol derivatives, namely, caffeic acid which acts as an inhibitor of α and β receptors helps in the diuretic process. Caffeic acid acts toward the center of the network, namely, as α 1 blockers are receptors for blood vessels. On the mechanism of hypertension, angiotensin II binds to the α 1 receptor, which is a receptor that regulates the action of vessels blood, thereby causing vasoconstriction. Caffeic acid will stick to the receptor, so that angiotensin II cannot

re-attach. This causes the blood vessels to vasodilation so that the blood will easy flow to the heart [7].

There are limitations in applying the results of the human studies discussed in this review to the general use of *M. palustris* BL products that have beneficial effects on health [10].

Conclusion

Research on *M. palustris* BL's bioactivity, which could decrease cholesterol, blood pressure, blood sugar, and the frequency of defecation as an antioxidant and immunomodulator, was investigated with an *in vivo* experimental design. The beneficial effect of *M. palustris* BL on reducing epigastric pain was only found in one study.

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