

**COMPARATIVE LITERATURE STUDY OF BLIGO FRUIT EXTRACT
(*Benincasa hispida* (Thunb) Cogn) AND BITTER MELON (*Momordica
charantia* L.) EXTRACT ON THE MINIMUM INHIBITION OF
Salmonella typhi BACTERIA**

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Abstract: *Salmonella typhi* is a gram-negative bacteria species that causes typhoid fever. *Salmonella typhi* is sensitive to antibiotics such as amoxicillin, chloramphenicol, ciprofloxacin, and cotrimoxazole. However, there has been some increase in antibiotic resistance, so there is a need for new antibacterials that do not have a resistance effect to treat infection. Bligo fruit (*Benincasa hispida* (Thunb) Cogn) and bitter melon (*Momordica charantia* L.) contain saponins, tannins, flavonoids, alkaloids, and triterpenoids which have antibacterial power. The purpose of this study was to compare the effectiveness of the bligo fruit extract (*Benincasa hispida* (Thunb) Cogn) and bitter melon extract (*Momordica charantia* L.) on the minimum inhibition of *Salmonella typhi* bacteria. The method used is narrative literature review. The results of the journal study showed that the extract of bitter melon (*Momordica charantia* L.) was more effective in inhibiting *Salmonella typhi* bacteria than the extract of bligo (*Benincasa hispida* (Thunb) Cogn) with a minimum inhibitory power at a concentration of 20%, namely 8.5 mm.

Keywords: Bligo Fruit (*Benincasa hispida* (Thunb) Cogn), Bitter Melon (*Momordica charantia* L.), *Salmonella typhi*.

INTRODUCTION

Salmonella typhi is a species of gram-negative bacteria that causes typhoid fever or the common people are familiar with typhus, which is an acute infectious disease of the human small intestine. The clinical symptom of this disease is a high fever for more than one week which increases gradually in the first week. Then the fever will persist (continuous) or remittance in the second week. The occurrence of fever, especially in the afternoon or evening. In addition, there are other symptoms such as anorexia, nausea, vomiting, headache, malaise, muscle aches, bradycardia, constipation and diarrhea. From the results of epidemiological data in 2015, an estimated 17 million cases of typhoid fever occurred globally, especially in South Asia, Southeast Asia, and sub-Saharan Africa. Typhoid fever is still a health problem and is an endemic disease in Indonesia.^{1,2}

Data in Indonesia shows that the highest incidence of typhoid fever is at the age of 3-19 years. *Salmonella typhi* is sensitive to antibiotics such as amoxicillin, chloramphenicol, ciprofloxacin, and cotrimoxazole. However, there has been some increase in antibiotic resistance due to chromosomal mutations or the exchange of genetic material through the processes of transformation, transduction, and conjugation through plasmids. For this reason, it is necessary to have new antibacterials that do not have a resistance effect to treat infections by utilizing medicinal plants. Medicinal plants that have the potential to be antibacterial are bligo and bitter melon.³

Bligo fruit is widely used as medicine because it has properties such as: antioxidants, anti-inflammatory, anti-ulcer, anti-obesity, anti-diarrheal agents, anti-compulsive effects, ACE (*angiotension converting enzyme*) inhibitor activity in

vitro, and as a treatment for Alzheimer's disease. The fruit contains essential oils, flavonoids, glycosides, sacrides, protein, carotene, vitamins, minerals, β -sitosterin and uronic acid.⁴

Pare is a wild variety of *Momordica charantia* which belongs to the Cucurbitaceae family or pumpkin family, consumed both as a vegetable and in traditional medicine. Certain common diseases such as diabetes mellitus, hypoglycemia, heart disease, HIV (*human immunodeficiency virus*), cancer, and microbial infections have been studied to be treated with phytochemical fractions and compounds isolated from the pumpkin family.⁵

The phytochemical results of bitter melon fruit contain saponins, resins, tannins, glycosides, alkaloids, and flavonoids which have antibacterial power against the bacteria *Escherichia coli*, *Subtilis aureus*, and *Bacillus subtilis*. As an antibacterial agent, alkaloids work so that the bacterial cell wall is not fully formed by disturbing the peptidoglycan substance in bacterial cells resulting in cell death. Flavonoids interfere with the function of the cytoplasmic membrane, inhibit DNA synthesis and also inhibit the transfer of energy needed by bacteria for metabolism.^{6,7}

Based on the reasons and reviews, there is currently no comparative study on the effectiveness of the bligo fruit extract (*Benincasa hispida* (Thunb) Cogn) and bitter melon extract (*Momordica charantia* L.) on the minimum inhibition of *Salmonella typhi*. So, this study was intended to compare the effectiveness of giving bligo and bitter melon extracts on the growth of *Salmonella typhi* bacteria. In this case, the researchers discussed the minimum inhibition of bligo and bitter melon extracts against *Salmonella typhi*.

RESEACRH METHOD

The research design used was a narrative literature review with

a qualitative review analysis technique.

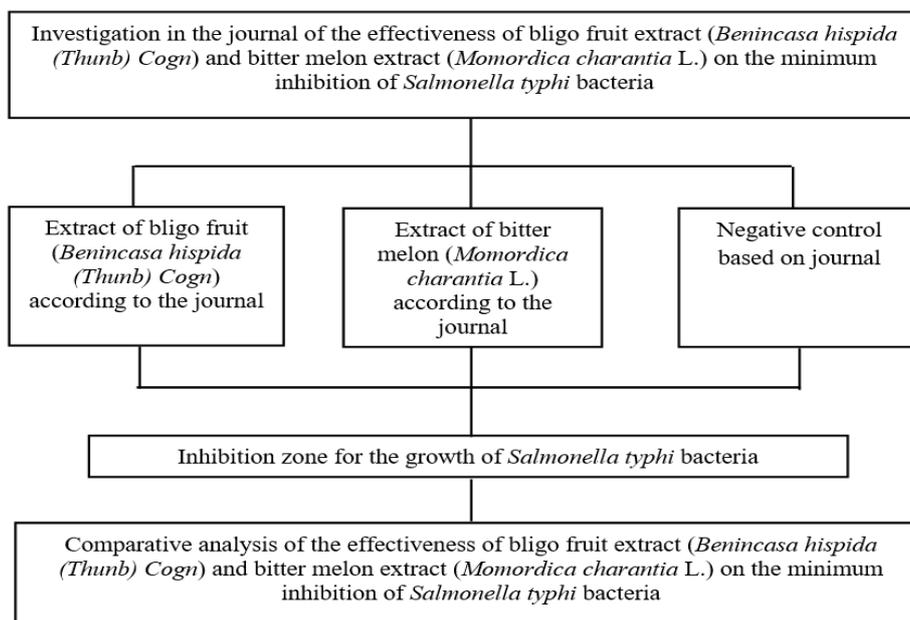


Figure 1 Flowchart of Problem Approach

Table 1 Operational Definition, Measuring Tools, Observation and Scale

Variable	Operational Definition	Measuring Instrument	Observation	Scale
Bligo fruit extract	Bligo fruit is washed, peeled and chopped so that the seeds are easily separated, then the pulp is mashed or blended until the juice is obtained. For the manufacture of 100 ml ethanol extract of fruit juice, 500 ml of 96% ethanol solvent was used in maceration for 7 days at room temperature and stirred every day. After 7 days the results are filtered using a flannel cloth and the filtrate is heated (below 55 ° C) then the extract is concentrated using a rotary evaporator using a 1000 mL distillation flask at a speed of 30 rpm then evaporated with a vacuum desiccator until a thick mass is obtained ⁸ .	Journal research results	The amount of extract according to the concentration is based on research according to the journal	Categorical
Pare extract	Pare extract using the maceration method. The method is that the dried bitter melon is soaked in 96% ethanol solvent for 24 hours then filtered using a filter cloth. Then it is soaked again in 96% ethanol until the ethanol color becomes clear again (perfectly extracted) ⁹ .	Journal research results	The amount of extract according to the concentration is based on research according to the journal	Categorical
Inhibition zone	A clear zone that looks clearer than the area around the paper disc or areas that are not covered by bacteria that have been implanted in the antibacterial activity test on culture media ⁹ .	Journal research results	The minimum diameter of the drag zone in mm is based on the journal	Ratio
Negative control	The negative control used sterile aquadest to see the antibacterial activity of the solvent against the growth of S. typhi bacteria ¹⁰ .	Journal research results	Results of measuring calipers / ruler (mm) based on journals	Ratio

Data is obtained from various sources such as Google Scholar, Garuda, PubMed.

Search journals on google scholar, Garuda, PubMed by typing keywords: *Benincasa hispida* (Thunb) Cogn extract, and bitter melon (*Momordica charantia* L.) fruit extract.

The first step is to collect research journals that match the inclusion criteria. Then to answer the research objectives of this review by grouping the data according to the measured results.

Summary of research journals entered into tables and sorted according to the format specified. Journals are read and examined to further clarify the analysis. Then look for the similarities and differences in the data that has been collected to draw conclusions.

Data analysis uses qualitative review by collecting data to obtain theories or findings that can be used as results or conclusions to answer research objectives. Data is presented in tabular form including the name of the researcher, year, plant, type of bacteria, method, concentration and inhibition.

RESULTS AND DISCUSSION

This research was conducted by browsing electronic databases such as google scholar, Garuda, PubMed. The process of selecting journals is carried out by means of identification, screening, eligibility, and included.

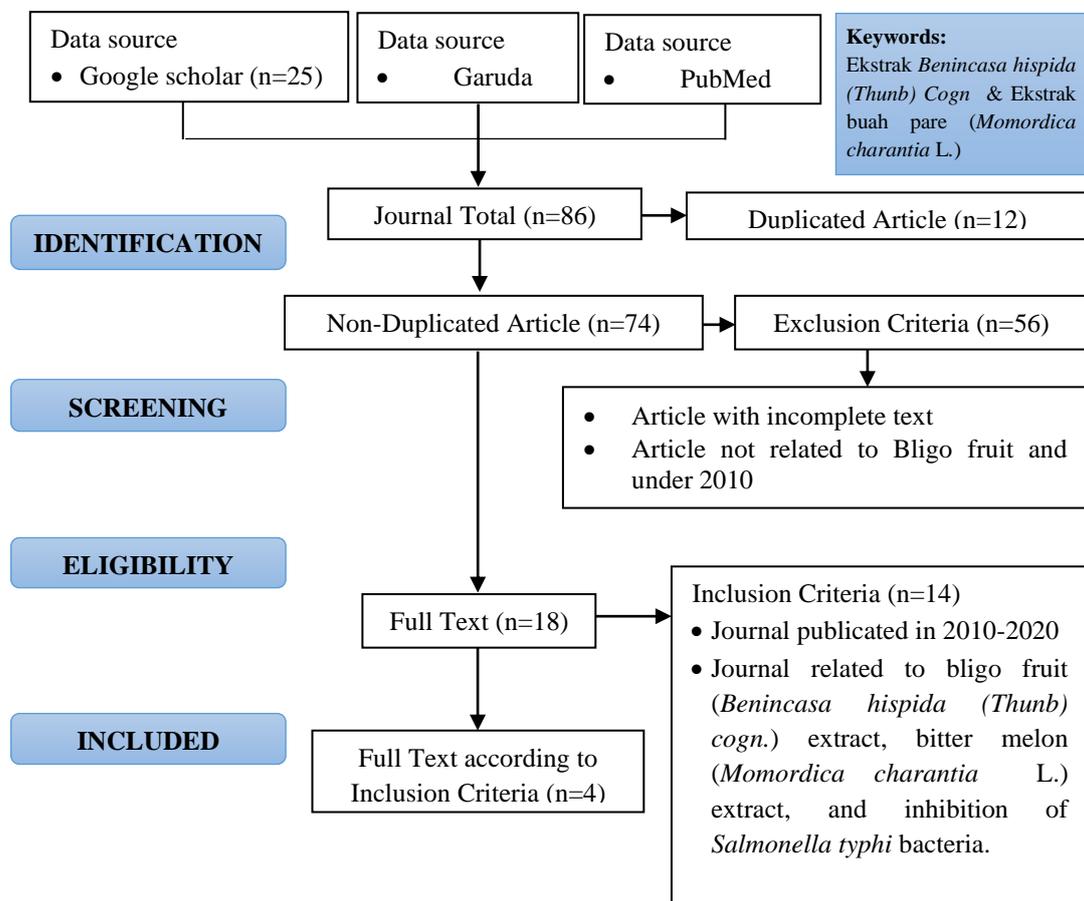


Figure 2 PRISMA Diagram

Based on the results of a review of research journals that have been conducted by several researchers who used bligo fruit extract (*Benincasa hispida* (Thunb) Cogn

and bitter melon extract (*Momordica charantia* L.) against the inhibition of *Salmonella typhi* bacteria.

Table 2 Table of Inhibition of Bligo Fruit and Bitter Melon Extracts against *Salmonella typhi* Bacteria

No.	Author	Year	Plant	Types of Bacteria	Method	Concentration	Inhibition
1.	Mubarak, et al	2018	Bligo fruit (<i>Benincasa hispida</i> (Thunb) Cogn)	<i>Salmonella typhi</i>	Diffusion	50%	0
						70%	25,223
						96%	6,815
2.	Duha, et al	2018	Pare fruit (<i>Momordica charantia</i> L.)	<i>Salmonella typhi</i>	Diffusion	25%	6,81
						50%	7,25
						75%	9,42
						100%	17.10
3.	Ulum & Khanifah	2017	Pare fruit (<i>Momordica charantia</i> L.)	<i>Salmonella typhi</i>	Diffusion	20%	8,5
						40%	12
						60%	12,5
						80%	13,5
4.	Komala, et al	2012	Pare fruit (<i>Momordica charantia</i> L.)	<i>Salmonella typhi</i>	Dilution	10% - 30%	-
						40% - 50%	Rarely
						60% - 80%	Not growing

In a study conducted by Mubarak, et al (2018) who examined the ethanol extract of bligo fruit against *Salmonella typhi* with concentrations of 50%, 70%, and 96% using the diffusion method. The results show that the minimum inhibitory power is 70% ethanol with an inhibition zone of 25,223 mm and a little interest in 96% ethanol and not 50% ethanol.¹¹

Based on the research of Duha et al (2018) and Ulum & Khanifah (2017), it can be concluded that the extract of bitter melon (*Momordica charantina*) against *Salmonella typhi* using the diffusion method obtained a minimum inhibitory power of 20% with an inhibition zone of 8.5 mm.^{9,12} Meanwhile, Komala et al. (2012) used the dilution method to obtain a minimum inhibitory concentration of 60% in the absence of *Salmonella typhi* bacterial growth.¹³

Based on the results of several previous studies, it was shown that the extract of bitter melon using diffusion and dilution methods could inhibit *Salmonella typhi* bacteria well. However, it is more effective in the diffusion method because it can clearly prove that there is a

minimum concentration in inhibiting bacterial growth. So it can be concluded

that the minimum inhibition zone of the ethanol extract of bitter melon fruit (*Momordica charantia* L.) against *Salmonella typhi* is in the research of Ulum & Khanifah (2017) with a concentration of 20%, namely 8.5 mm.⁹ While the minimum inhibitory power in bligo fruit is 70% ethanol with an inhibition zone of 25,223 mm.¹¹ So it can be concluded that the inhibitory power produced in these bacteria is more effective using bitter melon extract compared to bligo fruit extract. This is because according to Zaini et al. (2017) bitter melon contains compounds in the form of flavonoids, alkaloids, and saponins so that they can inhibit the growth of *Salmonella typhi* bacteria. The results of this study are expected to become a reference in utilizing research materials as traditional medicine in inhibiting bacteria.⁷

CONCLUSION

Extract of bitter melon (*Momordica charantia* L.) is more effective at inhibiting *Salmonella typhi* bacteria than bligo fruit extract (*Benincasa hispida* (Thunb) Cogn) with a minimum inhibitory power at a concentration of 20%, namely 8.5 mm.

It is recommended for further research to carry out phytochemical tests first on

the bligo fruit extract (*Benincasa hispida* (Thunb) Cogn) and bitter melon extract (*Momordica charantia* L.) to ensure the active content of the extract before conducting the research. It is necessary to carry out further research on the effectiveness of bligo (*Benincasa hispida* (Thunb) Cogn) against *Salmonella typhi* bacteria with different extraction methods. More research needs to be done regarding the beneficial effects of bligo (*Benincasa hispida* (Thunb) Cogn) and bitter melon (*Momordica charantia* L.).

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