



International Journal of Allied Medical Sciences and Clinical Research (IJAMSCR)

ISSN:2347-6567

IJAMSCR | Volume 7 | Issue 1 | Jan - Mar - 2019
www.ijamscr.com

Research article

Medical research

Potential Combination of Cinnamon Type *C. Burmanii* with *C. Cassia* as an Antibacterial Alternative in Perineal Wound Infection (Laboratory Study of *S. Haemolyticus* Culture of Perineum Wounds)

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ABSTRACT

Background

Use and misuse of antibiotics in puerperal infections can trigger the emergence of resistant bacteria. To overcome antibiotic resistance, tannin compounds, flavonoids and alkaloids in cinnamon serve as a safe antibacterial with fewer side effects.

Objective

Proving the combination of *C. Burmanii* with *C. cassia* as an antibacterial alternative to perineal wound infection.

Methods

Laboratory experiments in vitro. The study group was divided into 2 groups, namely the treatment group concentrations of 1.25%, 2.5%, 5% and 10%, the control group used Amoxicillin 500 mg. Data analysis using ANOVA test was then with Tukey HSD test.

Results

ANOVA test results were obtained 0.00 in the bacterium *S. haemolyticus*. p-value = 0.000 (<0.05) where antibacterial in cinnamon shows a significant difference in the zone of the killing of *S. haemolyticus* bacteria in perineal wound infection.

Conclusions and Recommendations

Tannin compounds, flavonoids and alkaloids in a combination of cinnamon are effective as an antibacterial alternative to perineum wound infections. clinical trial research is needed with experimental animal research subjects with a toxicity test to ensure that the extract is safe to use in experimental animals.

Keywords: Antibacterial activity, Cinnamon, Puerperal infection

INTRODUCTION

Post partum infection is a morbidity and mortality for postpartum mothers [1]. Postpartum infection is caused by the entry of germs into the

genitals during labor and childbirth [2]. Bacterial infections in wounds caused by several bacteria include streptococcus haemolyticus, staphylococcus aureus and escherichia coli. [3]. World Health Organization (WHO) data in 2015 for

postpartum infection was 5.4% [4]. Postpartum infection in Indonesia in 2007 of 11-30% occurred after childbirth [5].

The use and abuse of antibiotics in women who give birth can trigger the emergence of resistant bacteria [6]. According to a 2014 global report on monitoring antimicrobial resistance, bacterial resistance has reached alarming levels in many parts of the world [6]. Infections caused by bacteria that fail to respond to treatment result in prolonged illness, increased risk of death (greater risk of death) and the longer length of stay in the hospital (length of stay) [7].

Giving antibacterials derived from natural ingredients will reduce the resistance of bacteria to the body and not cause side effects. To overcome antibiotic resistance, essential oils and medicinal plant extracts present alternative solutions that are safer, more efficacious, and multifunctional [8] Cinnamon contains antibacterial which functions as a barrier and can kill bacteria.⁹Cinnamon also contains other compounds, namely alkaloids, tannins, and flavonoids which are known as antimicrobes that are safe with minimal side effects [9-11]. This study uses two types of cinnamon, Burmanii and Cassia. Tannin compounds, flavonoids and alkaloids from working combinations are interconnected so that the antibacterial work of a combination of cinnamon can resemble that of antibiotics.

Study Objectives

Proving the combination of cinnamon C. Burmanii with C. cassia as an antibacterial alternative to perineal wound infection

METHODS

In-vitro experimental laboratory. This study uses the dilution method by counting colonies. The research group was divided into 2 groups, namely

RESULT

Bivariate Analysis

S. haemolyticus bacteria

Table 4.1. The difference in the power of killing growth against S. haemolyticus bacteria (Number of Bacterial Colonies)

Differences Between Treatment Groups	F	Sig.
<i>S. haemolyticus a</i>	169,139	0,000

*One way Annova test result

the treatment group with a concentration of 1.25%, 2.5%, 5% and 10%, the control group using Amoxicillin 500 mg with 5 repetitions.

The extracted material is made from 1000 g cinnamon skin from Burmanii and Cassia (cinnamon powder) weighed and placed into a flask. Ethanol solvent with a concentration of 96% was added to the pumpkin until the plant material was immersed in a solvent. The extraction process takes 2 hours after boiling the solvent and is repeated three times. Ethanol extract was combined and evaporated using a rotary evaporator. After that, it is filtered to take flavonoid compounds, alkaloids and tannins. The test bacteria is *S. haemolyticus* from postpartum maternal wound exchange, bacteria were obtained from perineal swabs in postpartum mothers who had puerperal infections in the Semarang region, Indonesia. Then the bacteria are rejuvenated at the Semarang regional health laboratory. The method used is a series of 7 dilutions by estimating the number of microbes that can grow on bacteriological media and develop into colonies.

The number (concentration) of viable microbial organisms is estimated from a single dilution plate (assay) without a need for replicate plates. Our method selects the best agar plate with which to estimate the microbial counts, and takes into account the colony size and plate area that both contribute to the likelihood of miscounting the number of colonies on a plate.

Data Analysis

The analysis was carried out bivariate by calculating the size of the killing power of the antibacterial combination of cinnamon compared with Amoxicillin. In trials, group measurements were carried out 5 times and ordinal scale data on independent variables and ratios on independent variables

Based on table 4.1 shows that the concentration of cinnamon combination was obtained $p = 0,000$ ($p < 0.05$) which showed a difference between

treatment groups or differences in the size of the kill zone in each group

Table 4.2. Difference Test of Various Concentrations of Cinnamon with Amoxicillin to Kill the Power of S.haemolyticus Bacteria

Group	Group	Sig.
Concentration solution 1,25%	Concentration 2,5%	0,002
	Concentration 5%	0,000
	Concentration 10%	0,000
	Amoksisilin	0,000
Concentration solution 2,5%	Concentration 2,5%	0,002
	Concentration 5%	0,000
	Concentration 10%	0,000
	Amoksisilin	0,000
Concentration solution 5%	Concentration 2,5%	0,000
	Concentration 5%	0,000
	Concentration 10%	0,000
	Amoksisilin	0,000
Concentration solution 10%	Concentration 1,25%	0,000
	Concentration 2,5%	0,000
	Concentration 5%	0,000
	Amoksisilin	1,000
Amoksisilin	Concentration 1,25%	0,000
	Concentration 2,5%	0,000
	Concentration 5%	0,000
	Concentration 10%	1,000

*post hoc Tukey HSD

In table 4.2. showed that there was a significant difference in the 10% concentration group and Amoxicillin compared with 1.25%, 2.5% and 5% concentrations with $p = 0,000$ ($p < 0.05$). While at the concentration of 10% and Amoxicillin the value of $p = 1,000$ (> 0.05), which means there is no significant difference between the two groups. The antibacterial activity of extracts of combination cinnamon containing tannin, flavonoids and alkaloids showed all extract concentrations to kill the growth of S. haemolyticus bacteria. Cinnamon bark extract of 1.25%, 2.5%, 5% and 10% indicates that it can kill bacteria that cause infection in perineal wounds.

DISCUSSION

The combination of cinnamon containing tannin, flavanoid and alkaloid compounds has the same ability as Amoxicillin 500 mg. Cinnamon contains antibacterial which serves as a resistor and can kill bacteria [9]. Cinnamomum burmannii bark and leaves contain essential oils, saponins and flavonoids. Besides that the bark also contains tannins, the leaves also contain alkaloids and polyphenols and ethanol as wound healing.[13-

15]Cinnamon also contains other compounds, namely alkaloids, tannins, and flavonoids which are known as anti-microbes that are safe with minimal side effects [9-11] Reseach in 2015 study revealed that C.Cassia contains compounds that function as antibacterial. [9] Cinnamon extract, essential oils, and their compounds have been reported to inhibit bacteria by damaging cell membranes by changing lipid profiles, inhibiting ATPase, cell division, membrane porins, motility, and biofilm formation; and through anti-quorum sensing effects. [16].This is also supported by a study in 2016 that cinnamon has the greatest antibacterial activity when used alone, has the biggest additive effect and synergistic effects on bacteria in wounds. [17]

CONCLUSIONS

There is a significant difference in the concentration of 1.25%, 2.5%, 5% and 10% for the killing power of S.haemolyticus bacteria in perineal wound infection. A 10% concentration antibacterial is similar to Amoxicillin 500 mg, tannins, flavanoids and a 10% alkaloid concentration can be used as an antibacterial alternative to perineal wound infections caused by S. haemolyticus

Recommendation Future

Research can use samples of test animals by knowing more about whether cinnamon extract has an antibacterial effect on infected wounds.

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How to cite this article: Citra Adityarini Safitri, Rasipin, Supriyana. Potential Combination of Cinnamon Type *C. Burmannii* with *C. Cassia* as an Antibacterial Alternative in Perineal Wound Infection (Laboratory Study of *S. Haemolyticus* Culture of Perineum Wounds). *Int J of Allied Med Sci and Clin Res* 2019; 7(1): 57-60.

Source of Support: Nil.**Conflict of Interest:** None declared.