

Antimicrobial Activities of Thai Traditional Remedy “Kheaw-Hom” and Its Plant Ingredients for Skin Infection Treatment in Chickenpox

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Background: Kheaw-Hom is a Thai traditional remedy which appears in the National List of Essential Medicines 2011. This remedy consists of eighteen Thai medicinal plants. It has long been used in folk medicine to treat fever, measles, chickenpox and skin infection, but there has been no scientific report on antimicrobial activities of this remedy.

Objective: To investigate antimicrobial activities of Kheaw-Hom remedy extracts and its plant ingredients.

Material and Method: Kheaw-Hom remedy and each of its plant ingredients were extracted by maceration in 95% ethanol and decoction in water to obtain ethanolic extract and aqueous extract, respectively. All extracts were tested for antimicrobial activities by microtiter plate-based assay to determine the minimum inhibitory concentration (MIC) and the minimum microbicidal concentration (MMC) values against *Staphylococcus aureus* (ATCC 25923), methicillin-resistant *Staphylococcus aureus* (DMST 20651), *Staphylococcus epidermidis* (ATCC 12228) and *Candida albicans* (ATCC 90028).

Results: The ethanolic extract of Kheaw-Hom remedy showed antimicrobial activities against *Staphylococcus aureus*, methicillin-resistant *Staphylococcus aureus* and *Staphylococcus epidermidis* with MIC values of 0.625, 0.625 and 1.25 mg/ml, respectively and MMC values of 1.25, 0.625 and 2.5 mg/ml, respectively. Among all the ethanolic extracts of its plant ingredients, that of *Mammea siamensis* showed the highest activity with MIC values of 0.005, 0.005 and 0.039 mg/ml and MMC values of 0.005, 0.005 and 0.039 mg/ml, respectively. The weak activity against bacteria was found in the aqueous extract of some plant ingredients. The ethanolic and aqueous extracts of Kheaw-Hom remedy and the aqueous extract of its plant ingredients had no activity against *C. albicans* but the ethanolic extract of *Sophora exigua* showed the highest activities against *Candida albicans* with MIC values of 0.625 mg/ml and MMC values of 0.625 mg/ml.

Conclusion: The ethanolic extracts of Kheaw-Hom remedy had antimicrobial activity against *S. aureus*, methicillin-resistant *S. aureus* and *S. epidermidis* that are causes of skin infection from chickenpox. These results support the use of Kheaw-Hom remedy for skin infection treatment in chickenpox.

Keywords: Antimicrobial activity, Chickenpox, Kheaw-Hom remedy, Skin infection

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Chickenpox is a common infectious disease in children worldwide⁽¹⁾. In Thailand, the morbidity rate of chickenpox tends to increase and mostly occurs in children during 5-9 years old. Chickenpox is caused by a Varicella-zoster virus or Human herpes virus type 3. It can be serious, especially in patients with weakened immune systems⁽²⁾.

The clinical symptoms of chickenpox include

itchy rash, small red spots and blisters or pustules all over the body with a fever. All blisters have crusted and scab over. Most pox will not leave scars unless it is infected with bacteria probably introduced by scratching⁽³⁾.

The most common complication of chickenpox is secondary infection on the skin caused by bacteria accounting for 30-40% of all cases⁽⁴⁾. The bacteria that cause infections are *Staphylococcus aureus*⁽⁵⁾, methicillin-resistant *Staphylococcus aureus*, *Staphylococcus epidermidis* and the fungi is *Candida albicans*⁽⁶⁾. Skin infection can be treated by antibiotic drugs but they are high priced due to being imported from abroad; additionally,

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some bacteria can develop resistance to antibiotics. In addition, Acyclovir is an antiviral medicine often used only in high-risk patients who are immuno-compromised or pregnant⁽⁷⁾.

Kheaw-Hom remedy has been published in the National List of Essential Medicines 2011⁽⁸⁾. This remedy consists of eighteen Thai medicinal plants (Table 1) which folk medicines have been using to treat fever that belongs to the exanthematous fever group such as measles and chickenpox. Taking medicine can stimulate the toxin to appear on the skin while applying Kheaw-Hom can reduce the heat and rash on the skin. It is possible that Kheaw-Hom might have antimicrobial activities against microorganisms that cause skin infections. The previous studies reported that some herbs showed antimicrobial activities such as *Dracaena loureiri*, *Kaempferia galanga*, *Mimusops elengi*, *Mesua ferrea*, *Mammea siamensis*, *Nelumbo nucifera*⁽⁹⁾ and *Sophora exigua*⁽¹⁰⁾. However, there is no research on the antimicrobial activity of Kheaw-Hom as a remedy. Therefore, the objectives of this research are to investigate antimicrobial activities that cause skin infection from chickenpox and the ethanolic and aqueous extracts of Kheaw-Hom remedy and its plant ingredients. The positive results are expected to support the use of this for the treatment skin infection from chickenpox.

Material and Method

Chemicals and reagents

The 95% ethanol was purchased from CMJ Anchor Company, Thailand. Dimethyl sulfoxide was purchased from RCI Labscan, Thailand. Nutrient Agar, Mueller-Hinton Agar, Brain Heart Infusion Agar, Sabouraud Dextrose Agar, Mueller-Hinton Broth and Brain Heart Infusion Broth were purchased from Difco, USA. Resazurin sodium salt was purchased from Sigma, USA.

Plant materials and extraction

Plant materials were purchased from Charernsuk Osot pharmacy, Nakhon Pathom, Thailand. They were prepared to be herbarium and kept to be specimens for identification (Table 1). Plant materials were cleaned with water, sliced into small pieces and dried in a hot air oven at 50°C. Dried plant materials were ground to crude powder. Each plant material was weighed and mixed to the Kheaw-Hom remedy.

Maceration method

The crude powder (200 g) of the remedy and

its ingredients were macerated in 95% ethanol for 3 days and filtered through a Whatman No. 1 filter paper. Filtrate was dried by rotary evaporator. The maceration was repeated twice with residue and dried again by vacuum drying.

Decoction method

The crude powder (200 g) remedy and its plant ingredients were boiled in distilled water for 15 minutes and filtered through a Whatman No. 1 filter paper. This boiling was repeated twice with the residue and dried by lyophilizer.

All extracts were calculated as a percentage of yields (Table 1) and kept at -20°C until use.

Determination of antimicrobial activities

Microorganisms

Three types of gram positive bacteria *Staphylococcus aureus* (ATCC 25923), methicillin-resistant *Staphylococcus aureus* (DMST 20651), *Staphylococcus epidermidis* (ATCC 12228) and one type of fungi *Candida albicans* (ATCC 90028) was used for testing.

Preparation of inoculums

S. aureus and methicillin-resistant *S. aureus* were cultured in Nutrient agar (NA) and *S. epidermidis* was cultured in Brain Heart Infusion Agar (BHIA) at 37°C for 24 hours. The fungi *C. albicans* were cultured in Sabouraud Dextrose Agar (SDA) at 37°C for 48 hours.

Three to five isolated colonies of *S. aureus*, methicillin-resistant *S. aureus* and *C. albicans* were selected with an inoculating loop, and transferred into 3 ml of Mueller-Hinton Broth (MHB), except *S. epidermidis* was transferred into 3 ml of Brain Heart Infusion Broth (BHIB). The inoculums were incubated in a shaking incubator at 37°C for 2 hours. The turbidity of bacteria and fungi were adjusted to 0.5 McFarland standards (1.5×10^8 CFU/ml).

Minimum inhibitory concentration (MIC)

The minimum inhibitory concentration (MIC) values were determined the lowest concentration of an extracts that inhibit the microorganism by microtiter plate-based assay, described by Sarker et al, 2007⁽¹¹⁾. The bacteria were cultured for 24 hours and the fungi was cultured for 48 hours. The inoculum was adjusted to 0.5 McFarland standards and diluted with sterile Mueller-Hinton Broth (MHB) at 1:200 to give a final concentration of microorganism to 5×10^5 CFU/ml. The ethanolic extracts were diluted with dimethylsulfoxide

Table 1. The ethnobotanical data and percentage of yield of Kheaw-Hom ingredients

Scientific name	Family name	Thai name	Part used	Traditional used	% yield	
					Ethanol	Aqueous
<i>Angioperis evecta</i> (G.Forst) Hoffm.	MARATTIACEAE	Wan keep rat	Rhizome	Reduce fever, use as astringent, treat diarrhea	1.27	10.77
<i>Cordyline fruticosa</i> (L.) A.Chev. (Red leaves)	ASPARAGACEAE	Mak phu	Leaf	Reduce fever, treat exanthematous fever and itch	9.09	18.01
<i>Cordyline fruticosa</i> (L.) A.Chev. (Green leaves)	ASPARAGACEAE	Mak mia	Leaf	Reduce fever, treat exanthematous fever and itch	10.15	16.82
<i>Cyathea gigantea</i> Holtt.	CYATHEACEAE	Ma has sa dam	Stem	Reduce fever and pain, treat cough and diarrhea	1.53	4.41
<i>Dracaena laurteri</i> Gagnep.	DRACAENACEAE	Chan daeng	Stem	Reduce fever, treat cough, scurvy and abscess	19.49	2.25
<i>Eupatorium stochadosmum</i> Hance.	COMPOSITAE	San phra hom	Leaf	Treat exanthematous fever, use as astringent	7.70	20.29
<i>Globba malaccensis</i> Ridl.	ZINGIBERACEAE	Wan ron thong	Rhizome	Use as antiallergic, insect bites, treat diarrhea	7.38	7.29
<i>Kaempferia galanga</i> Linn.	ZINGIBERACEAE	Proh hom	Rhizome	Treat cold with nasal congestion, use as carminative	3.52	13.41
<i>Linnophila rugosa</i> Merr.	SCROPHULARIACEAE	Phak krachom	Leaf	Treat exanthematous fever	8.45	20.88
<i>Mammea siamensis</i> Kosterm.	GUTTIFERAE	Sa ra phi	Flower	Cardiac tonic, treat vertigo	17.21	30.56
<i>Mesua ferrea</i> Linn.	GUTTIFERAE	Bun nak	Flower	Cardiac tonic, blood tonic, treat vertigo	17.50	13.36
<i>Mimusops elengi</i> Linn.	SAPOTACEAE	Phi kul	Flower	Cardiac tonic, treat vertigo	8.40	13.61
<i>Myristica fragrans</i> Hoult.	MYRISTICACEAE	Chan thet	Stem	Reduce fever, use as carminative	1.05	1.70
<i>Nelumbo nucifera</i> Gaertn.	NELUMBONACEAE	Bua luang	Pollen	Cardiac tonic, treat vertigo and faintness	8.40	19.59
<i>Pogostemon cablin</i> (Blanco) Benth.	LABIATAE	Phim sen thon	Leaf	Reduce fever, use as diuretic and carminative	5.67	16.25
<i>Sophora exigua</i> Craib.	FABACEAE	Phit sa nat	Trunk	Reduce fever, increase breast milk	11.60	9.11
<i>Tacca chantrieri</i> Andre.	TACCACEAE	Nae ra phu sri	Rhizome	Reduce fever, use as astringent, treat diarrhea, cough	3.27	14.25
<i>Vetiveria zizanioides</i> (L.) Nash ex Small	GRAMINEAE	Faek hom	Root	Use as diuretic and carminative, treat stomachache	2.73	41.13
Kheaw-Hom remedy	-	-	-	Treat fever, measles and chickenpox	8.75	13.36

(DMSO) and the aqueous extracts were diluted with sterile distilled water and filtrated with Millipore filter 0.22 μm . Then, the extracts were diluted with Mueller-Hinton Broth (MHB) to 10 mg/ml except *S. epidermidis* was diluted with Brain Heart Infusion Broth (BHIB). Serial two-fold dilutions of each extracts were prepared. The 50 μl of each concentration of extracts solution and 50 μl of the inoculum were added into 96-well plates. Gentamicin and Amphotericin B in serial two-fold dilutions were used as positive control. The plates were covered with a plastic wrap and incubated in a shaking incubator at 37°C for 24 hours and fungi for 48 hours. After that, 10 μl of resazurin at concentration 1 mg/ml was added into each well and incubated in a shaking incubator at 37°C for 2 hours. The result was interpreted by the change of color of resazurin. The MIC value was the lowest concentration of crude extract solution that was able to inhibit microorganisms by displaying the blue color of resazurin. The resazurin was changed to purple or pink color when the extract solutions did not inhibit microorganisms. Positive controls were Gentamicin for bacteria and Amphotericin B for fungi.

Minimum microbicidal concentration (MMC)

The minimum microbicidal concentration (MMC) values were determined after taking the MIC values immediately. The MMC was taken from a row of all the wells with no visible growth in them and transferred to agar plates. The plates were incubated at 37°C for 24 hours.

The lowest concentration of the extract showing no growth was evaluated as the MMC values.

Results

Percentage yields of the Kheaw-Hom remedy and its plant ingredients were shown in Table 1. The percentage yields of the ethanolic and aqueous extract of Kheaw-Hom remedy were 8.75% and 13.36%, respectively. The highest percentage yield of the ethanolic extract was *D. lourieri* (19.49%) and the highest percentage yield of the aqueous extract was *M. siamensis* (30.56%).

All extracts were tested antimicrobial activities against three types of gram positive bacteria (*S. aureus*, methicillin-resistant *S. aureus* and *S. epidermidis*) and one type of fungi (*C. albicans*) that relate with skin infection in chickenpox by using microtiter plate-based assay to determine minimum inhibitory concentration (MIC) and minimum microbicidal concentration (MMC).

MIC and MMC values of the ethanolic extracts of Kheaw-Hom remedy and its plant ingredients were shown in Table 2. The results found that most ethanolic extracts of Kheaw-Hom remedy and its plant ingredients were able to inhibit three gram positive bacteria. The ethanolic extract of Kheaw-Hom remedy showed antimicrobial activity against *S. aureus*, methicillin-resistant *S. aureus* and *S. epidermidis* with MIC values of 0.625, 0.625 and 1.25 mg/ml and MMC values of 1.25, 0.625 and 2.5 mg/ml, respectively. Among all the ethanolic extracts of its plant ingredients, that of *M. siamensis* showed the highest activity with MIC values of 0.005, 0.005 and 0.039 mg/ml and MMC values of 0.005, 0.005 and 0.039 mg/ml, respectively. The ethanolic extract of Kheaw-Hom remedy had no activity against *C. albicans*. However, the ethanolic extract of *S. exigua* that is one of ingredient in this remedy was shown the highest activity against *C. albicans* with MIC value of 0.625 mg/ml and MMC value of 0.625 mg/ml.

MIC and MMC values of the aqueous extracts of Kheaw-Hom remedy and its plant ingredients were shown in Table 3. The results found that the MIC and MMC values against all microbes ranged from 1.25 to 5 mg/ml. The aqueous extract of Kheaw-Hom remedy had no activity against all bacteria. Among all the aqueous extract of its plant ingredients, that of *N. nucifera* showed the highest activity against *S. aureus*, methicillin-resistant *S. aureus* and *S. epidermidis* with MIC values of 1.25, 1.25 and 2.5 mg/ml and MMC values of 1.25, 1.25 and 2.5 mg/ml, respectively whereas the aqueous extract of Kheaw-Hom remedy and its plant ingredients had no activity against *C. albicans*.

Discussion

Kheaw-Hom remedy and its plant ingredients were extracted by different methods showed different yields of extract. The most aqueous extracts had higher yield than the ethanolic extracts.

There are seven plant ingredients in the Kheaw-Hom remedy that were reported in the previous study on antimicrobial activities against *S. aureus* and methicillin-resistant *S. aureus* including *D. loureiri*, *K. galanga*, *M. elengi*, *M. ferrea*, *M. siamensis*, *N. nucifera*, except *S. exigua* was reported with antimicrobial activities only against methicillin-resistant *S. aureus*. Firstly, the previous study was demonstrated the antimicrobial activity against *S. aureus* and methicillin-resistant *S. aureus* that the ethanolic extract of *D. loureiri*, *K. galanga*, *M. elengi* and *N. nucifera* had weak activity⁽⁹⁾ the same as in this

Table 2. Minimum inhibitory concentration MIC (mg/ml) and minimum microbicidal concentration MMC (mg/ml) values of the ethanolic extracts of Kheaw-Hom remedy and its plant ingredients (n = 3)

Plants name	<i>S. aureus</i>		Methicillin-resistant <i>S. aureus</i>		<i>S. epidermidis</i>		<i>C. albicans</i>	
	MIC	MMC	MIC	MMC	MIC	MMC	MIC	MMC
<i>A. evecta</i>	NI	-	NI	-	NI	-	NI	-
<i>C. fruticosa</i> (Red leaves)	NI	-	NI	-	NI	-	NI	-
<i>C. fruticosa</i> (Green leaves)	NI	-	NI	-	NI	-	NI	-
<i>C. gigantea</i>	5	5	2.5	2.5	5	5	NI	-
<i>D. loureiri</i>	2.5	2.5	2.5	2.5	1.25	5	2.5	2.5
<i>E. stoechadosmum</i>	1.25	1.25	2.5	2.5	1.25	1.25	1.25	1.25
<i>G. malaccensis</i>	2.5	2.5	2.5	5	2.5	5	2.5	5
<i>K. galanga</i>	NI	-	NI	-	NI	-	0.625	2.5
<i>L. rugosa</i>	5	5	NI	-	NI	-	NI	-
<i>M. siamensis</i>	0.005	0.005	0.005	0.005	0.039	0.039	NI	-
<i>M. ferrea</i>	0.156	0.625	0.625	0.625	0.625	0.625	NI	-
<i>M. elengi</i>	NI	-	NI	-	NI	-	NI	-
<i>M. fragrans</i>	5	5	NI	-	NI	-	NI	-
<i>N. nucifera</i>	1.25	1.25	NI	-	NI	-	NI	-
<i>P. cablin</i>	0.625	0.625	1.25	2.5	0.625	1.25	2.5	5
<i>S. exigua</i>	0.156	0.313	0.156	0.313	0.156	0.313	0.625	0.625
<i>T. chantrieri</i>	2.5	2.5	2.5	2.5	5	5	NI	-
<i>V. zizanioides</i>	NI	-	NI	-	NI	-	NI	-
Kheaw-Hom	0.625	1.25	0.625	0.625	1.25	2.5	NI	-
Gentamicin*	0.195	-	>100	-	0.195	-	-	-
Amphotericin B*	-	-	-	-	-	-	1	-

* The positive controls were represented with MIC values ($\mu\text{g/ml}$)
NI = No inhibition

present study. Secondly, the ethanolic extracts of *M. ferrea* had moderate activity against *S. aureus*⁽⁹⁾ with better MIC value than the previous study estimate of 4 times and against Methicillin-resistant *S. aureus* with a lower MIC values estimate of 2 times. Next, the previous study reported that the ethanolic extract of *M. siamensis* had moderate efficacy against *S. aureus* and methicillin-resistant *S. aureus*⁽⁹⁾. While this present study showed higher antimicrobial activity against both strains than the previous study with MIC values of 250 and 125 times, respectively, the different source of plant materials may have influenced the results. Finally, the ethanolic extract of *S. exigua* had good activity against methicillin-resistant *S. aureus* while flavanone isolated from *S. exigua* also inhibited this microbe⁽¹⁰⁾ in the previous studies. Nevertheless, there had been no reports of any antimicrobial activity against *S. epidermidis* and *C. albicans*.

Interestingly, this study found that

the ethanolic extract of *S. exigua* showed high antimicrobial activity against *S. aureus*, *S. epidermidis* and *C. albicans* with MIC values of 0.156, 0.156 and 0.625 mg/ml, respectively, and MMC values of 0.313, 0.313 and 0.625 mg/ml, respectively. Furthermore, these results of *S. exigua* have never been reported. The present study is the first report on antimicrobial activity of the Kheaw-Hom remedy. Although the aqueous extract of Kheaw-Hom remedy had no activity, the ethanolic extract had moderate activity against *S. aureus*, methicillin-resistant *S. aureus* and *S. epidermidis* that causes of skin infection in chickenpox⁽⁵⁾. The results related to Thai traditional usage that is recommended to both intake and apply medicine on skin for secondary infection caused by bacteria from chickenpox. Some plants in this remedy have an astringent taste such as *M. siamensis*. It may be astringent aspect that heals the blisters, pustules and prevents scarring. *M. siamensis* is a member of

Table 3. Minimum inhibitory concentration MIC (mg/ml) and minimum microbicidal concentration MMC (mg/ml) values of the aqueous extracts of Kheaw-Hom remedy and its plant ingredients (n = 3)

Plants name	<i>S. aureus</i>		Methicillin-resistant <i>S. aureus</i>		<i>S. epidermidis</i>		<i>C. albicans</i>	
	MIC	MMC	MIC	MMC	MIC	MMC	MIC	MMC
<i>A. evecta</i>	NI	-	NI	-	NI	-	NI	-
<i>C. fruticosa</i> (Red leaves)	NI	-	NI	-	NI	-	NI	-
<i>C. fruticosa</i> (Green leaves)	NI	-	NI	-	NI	-	NI	-
<i>C. gigantea</i>	NI	-	NI	-	NI	-	NI	-
<i>D. loureiri</i>	2.5	2.5	2.5	2.5	1.25	1.25	NI	-
<i>E. stoechadosmum</i>	NI	-	5	5	NI	-	NI	-
<i>G. malaccensis</i>	NI	-	NI	-	NI	-	NI	-
<i>K. galanga</i>	NI	-	NI	-	NI	-	NI	-
<i>L. rugosa</i>	NI	-	NI	-	NI	-	NI	-
<i>M. siamensis</i>	2.5	5	2.5	5	NI	-	NI	-
<i>M. ferrea</i>	2.5	2.5	2.5	2.5	2.5	2.5	NI	-
<i>M. elengi</i>	5	5	5	5	5	5	NI	-
<i>M. fragrans</i>	NI	-	5	5	NI	-	NI	-
<i>N. nucifera</i>	1.25	1.25	1.25	1.25	2.5	2.5	NI	-
<i>P. cablin</i>	2.5	2.5	NI	-	2.5	2.5	NI	-
<i>S. exigua</i>	5	5	5	5	5	5	NI	-
<i>T. chantrieri</i>	5	5	5	5	NI	-	NI	-
<i>V. zizanioides</i>	NI	-	NI	-	NI	-	NI	-
Kheaw-Hom	NI	-	NI	-	NI	-	NI	-
Gentamicin*	0.195	-	>100	-	0.195	-	-	-
Amphotericin B*	-	-	-	-	-	-	1	-

* The positive controls were represented with MIC values ($\mu\text{g/ml}$)
NI = No inhibition

Guttiferae family⁽¹²⁾. Plants in this family always showed good antimicrobial activity⁽¹³⁾ such as mangosteen peel. Thus, this plant is used in many remedies in Thai traditional medicine and should be continuously studied to isolate antibacterial compounds instead antibiotic use or using crude extract which showed other high biological activity such as cytotoxicity against cancer cell. This result might be used to develop an antimicrobial product or cancer product based on antimicrobial activity.

Conclusion

The ethanolic extract of Kheaw-Hom remedy showed antimicrobial activity against *S. aureus*, methicillin-resistant *S. aureus* and *S. epidermidis* that causes of skin infection in chickenpox. In addition, the ethanolic extract of some plant ingredients such as *M. siamensis* and *S. exigua* exhibited great antimicrobial activity. These results support the use of this Thai traditional remedy for the treatment skin infection from

chickenpox. Product development of the Kheaw-Hom remedy should be continuously investigated as the drug of choice for skin infection treatment caused chickenpox.

What is already known on this topic?

Thai traditional medicine uses Kheaw-Hom remedy for treating fever, measles, chickenpox and secondary infection on the skin caused by bacteria. The ethanolic extracts of some plants of this remedy including *Dracaena loureiri*, *Kaempferia galanga*, *Mimusops elengi*, *Mesua ferrea*, *Mammea siamensis*, *Nelumbo nucifera* and *Sophora exigua* showed antimicrobial activity against *S. aureus* and methicillin-resistant *S. aureus* such as. However, the Kheaw-Hom remedy was not the subject of any previous reporting on its antimicrobial activity.

What this study adds?

The present study showed the antimicrobial

activity of the ethanolic extract of Kheaw-Hom against *S. aureus*, methicillin-resistant *S. aureus* and *S. epidermidis* that cause skin infection from chickenpox, but the aqueous extract had no activity. In addition, the ethanolic extract of *Mammea siamensis* showed the highest activity. This knowledge will support the use of the Kheaw-Hom remedy to treat secondary infection on the skin caused by bacteria from chickenpox.

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Potential conflicts of interest

None.

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การศึกษาฤทธิ์ต้านจุลชีพของตำรับยาเขียวหอมและสมุนไพรวัดในตำรับสำหรับรักษาการติดเชื้อที่ผิวหนังในโรคอีสุกอีใส

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ภูมิหลัง: ตำรับยาเขียวหอมเป็นตำรับยาไทยอยู่ในบัญชียาหลักแห่งชาติ พุทธศักราช 2554 ประกอบด้วยสมุนไพรวัด 18 ชนิด ใช้บรรเทาอาการไข้ แก้พิษหัด พิษอีสุกอีใส ซึ่งยังไม่เคยมีรายงานการศึกษาถึงฤทธิ์ต้านจุลชีพมาก่อน

วัตถุประสงค์: เพื่อศึกษาฤทธิ์ต้านจุลชีพของสารสกัดตำรับยาเขียวหอมและสมุนไพรวัดในตำรับ

วัสดุและวิธีการ: สกัดสารด้วยวิธีการหมักด้วยเอทานอลความเข้มข้น 95% และสกัดด้วยวิธีการต้ม นำสารสกัดไปทดสอบฤทธิ์ต้านจุลชีพด้วยวิธี microtiter plate-based assay เพื่อหาค่าความเข้มข้นต่ำสุดที่สามารถยับยั้งการเจริญเติบโตของเชื้อ (MIC) และค่าความเข้มข้นต่ำสุดที่สามารถฆ่าเชื้อ (MMC) ได้โดยทดสอบกับเชื้อ *Staphylococcus aureus* (ATCC 25923), methicillin-resistant *Staphylococcus aureus* (DMST 20651), *Staphylococcus epidermidis* (ATCC 12228) และ *Candida albicans* (ATCC 90028)

ผลการศึกษา: สารสกัดเอทานอลของตำรับยาเขียวหอมมีฤทธิ์ยับยั้งเชื้อ *S. aureus* (ATCC 25923), methicillin-resistant *S. aureus* (DMST 20651) และ *S. epidermidis* (ATCC 12228) ด้วยค่า MIC เท่ากับ 0.625, 0.625 และ 1.25 mg/ml และค่า MMC เท่ากับ 1.25, 0.625 และ 2.5 mg/ml ตามลำดับ สารสกัดเอทานอลของสารสกัด (Mammea siamensis) มีฤทธิ์ยับยั้งเชื้อทั้ง 3 ชนิดนี้ได้ดีที่สุด โดยมีค่า MIC เท่ากับ 0.005, 0.005 และ 0.039 mg/ml และค่า MMC เท่ากับ 0.005, 0.005 และ 0.039 mg/ml ตามลำดับ ส่วนสารสกัดน้ำของสมุนไพรวัดยวบางชนิดในตำรับ มีฤทธิ์อ่อนในการยับยั้งเชื้อแบคทีเรีย สารสกัดเอทานอลและสารสกัดน้ำของตำรับยาเขียวหอม รวมทั้งสารสกัดน้ำของสมุนไพรวัดยวในตำรับไม่สามารถยับยั้ง เชื้อ *C. albicans* (ATCC 90028) ในขณะที่สารสกัดเอทานอลของพืชนาสน์ (*Sophora exigua*) มีฤทธิ์ยับยั้งเชื้อราชนิดนี้ได้ดีที่สุดในครั้งนี้ โดยมีค่า MIC เท่ากับ 0.625 mg/ml และค่า MMC เท่ากับ 0.625 mg/ml

สรุป: สารสกัดเอทานอลของตำรับยาเขียวหอมมีฤทธิ์ยับยั้งเชื้อ *S. aureus* (ATCC 25923), methicillin-resistant *S. aureus* (DMST 20651) และ *S. epidermidis* (ATCC 12228) ซึ่งเป็นสาเหตุของการติดเชื้อผิวหนังแทรกซ้อนในโรคอีสุกอีใส จากผลการศึกษาดังกล่าวสามารถสนับสนุนการใช้ตำรับยาเขียวหอมในการรักษาการติดเชื้อแบคทีเรียในโรคอีสุกอีใสได้
