

**ANTIBACTERIAL PROPERTY AND TOXICITY STUDY OF
MEDICINAL PLANT *TINOSPORA CRISPA* L.**

ALTAMMAR KHADIJAH AHMED Y

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ABSTRACT

Tinospora crispa is a medically important herb used for centuries in traditional medicine for the treatment of various ailments. The aim of this study was to investigate the safety of the aqueous and alcoholic extract of *Tinospora crispa* by determining its toxicological effects after acute administration in rats, and to investigate the antibacterial activity of both extracts. Disc diffusion and broth dilution methods were carried out in determining the antibacterial effects of the plant extract on the pure cultures of clinical isolates of 8 MRSA and *S. aureus* ATCC strain. The disc-diffusion method of the ethanolic extracts showed inhibition zone on the tested organisms. The minimum inhibitory concentration (MIC) of the ethanolic extracts on the tested organisms after 48 hours was 25 mg/ml while that of aqueous extract has no effect on majority of the test organisms. Acute toxicity study with a higher dose of 4 g/kg ethanolic extract and 2 g/kg aqueous extracts did not manifest any toxicological signs in rats. However, aqueous extract showed mortality at 4 g/kg. No significant changes of biochemical parameters (liver and renal functions) were observed between control groups and surviving rats. In conclusion, it was demonstrated that ethanolic extract of *T. crispa* is a promising anti-MRSA agent, and the value of LD₅₀ was estimated as greater than administrated dose (4 g/kg).

ABSTRAK

Pokok Patawali atau nama sainsnya *Tinospora crispa (miers)* adalah tumbuhan herba ubat-ubatan penting yang digunakan selama berabad-abad lamanya dalam perubatan tradisional bagi pengubatan pelbagai penyakit. Tujuan kajian ini adalah untuk menyiasat keselamatan ekstrak air dan alkohol daripada *Tinospora crispa* dengan menentukan kesan toksik selepas diaplikasikan ke atas tikus, dan untuk mengetahui aktiviti antibakteria daripada kedua-dua ekstrak. Kaedah disk-difusi dan broth dilution dilakukan dalam menentukan kesan antibakteria ekstrak ke atas bakteria 8 MRSA dan *S. aureus* strain ATCC yang diisolasi daripada kultur asli. Kaedah disk-difusi daripada ekstrak etanol menunjukkan adanya zon hambatan ke atas organisma yang diuji. Konsentrasi hambat minimum (MIC) daripada ekstrak ethanol ke atas organisma diuji selepas 48 jam adalah sebanyak 25 mg/ml sedangkan ekstrak air tidak menunjukkan kesan ke atas sebahagian besar organism yang diuji. Kajian toksisiti akut dengan dos yang lebih tinggi daripada 4 g/kg ekstrak etanol dan 2 g / kg ekstrak air tidak menunjukkan tanda-tanda toksik ke atas tikus. Namun, ekstrak air mencatatkan kematian tikus pada dos 4 g/kg. Tidak ada perubahan yang signifikan dalam parameter biokimia (fungsi hati dan ginjal) yang ditunjukkan antara kumpulan kawalan dan tikus yang hidup. Sebagai kesimpulan, dari hasil uji yang dilakukan, ekstrak etanol *T. crispa* berpotensi sebagai agen anti-MRSA, dan nilai LD₅₀ dianggarkan lebih besar dari dos diadministrasikan (4 g/kg).

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ABRIVIATION AND SYMBOLES

%	percentage
-	Minus
×	Multiply
±	Plus minus
<	Less than
/	Divide by
° C	Degree of Celsius
mm	Millimeter
L	Liter
μg	Microgram
μl	Microliter
mg	Milligram
ml	Milliliter
LD ₅	Median lethal dose
ATCC	American Type Culture Collection
g	Gram
sp.	Species
Kg	Kilogram
SD	Standard deviation

<i>et al.</i>	And other people
H&E	Hematoxylin and eosin
UMMC	University Malaya Medical Center
S.E.M	Standard Error of Mean
DMSO	Dimethyl sulfoxide
CA MRSA	Community-acquired MRSA
VISA	Vancomycine-intermediate <i>Staphylococcus aureus</i>
VRSA	Vancomycine-resistant <i>Staphylococcus aureus</i>
WHO	World Health Organization
MHA	Mueller Hinton Agar
MHB	Mueller Hinton Broth
MIC	Minimum inhibition concentration
GHS	Globally Harmonized Systems
CFU	Colony forming units
CLSI	Clinical Laboratory Standards Institute
OECD	Organization for Economic Cooperation and Development