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Dedi Sumantri, Chaira Maulida

Online First: January 03, 2019

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Arufiadi Anityo Mochtar, Surahman Hakim, Tyas Priyatini, Shirley Anggraini Tunggadewi, Erwinanto Erwinanto, M Thohar Arifin

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Komang Aditya Arya Prayoga, Ni Nengah Dwi Fatmawati

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Research Article

**Correlation between clean and healthy lifestyle behavior of mother with the incident of diarrhea in toddlers at working area of Puskesmas I Negara, Jembrana - Bali**  
(<https://isainsmedis.id/index.php/ism/article/view/180>)

Sharmila Rajan Inderan, Wayan Weta

Online First: December 15, 2018

| DOI:

10.15562/ism.v9i3.180

(<http://dx.doi.org/10.15562/ism.v9i3.180>)

Research Article

**Prevalence of obesity and factors contributes to obese among medical student in Medical Faculty of Udayana University in 2016**  
(<https://isainsmedis.id/index.php/ism/article/view/288>)

Shenbagam Mahalingam, Desak Wihandani

Online First: December 15, 2018

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([HTTPS://ISAINSMEDIS.ID/INDEX.PHP/ISM/ARTICLE/VIEWFILE/288/209](https://isainsmedis.id/index.php/ism/article/viewfile/288/209))

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**Prevalensi infeksi soil transmitted helmith di Sekolah Dasar Negeri 1 Padangbulia Kecamatan Sukasada Kabupaten Buleleng, Bali-Indonesia**  
(<https://isainsmedis.id/index.php/ism/article/view/315>)

Ni Putu Akopita Devi, I Made Sudarmaja, Kadek Swastika

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10.15562/ism.v9i3.315

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([HTTPS://ISAINSMEDIS.ID/INDEX.PHP/ISM/ARTICLE/VIEWFILE/315/210](https://isainsmedis.id/index.php/ism/article/viewfile/315/210))

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**Pola penggunaan insulin pada pasien diabetes mellitus tipe 2 di poli penyakit dalam RSUD Negara Periode Juli – Agustus 2018**  
(<https://isainsmedis.id/index.php/ism/article/view/306>)

Komang ayu Vitriana Gamayanti, Ni Luh Made Novi Ratnasari, Agha Bhargah

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([HTTPS://ISAINSMEDIS.ID/INDEX.PHP/ISM/ARTICLE/VIEWFILE/306/212](https://isainsmedis.id/index.php/ism/article/viewfile/306/212))

Research Article

Research Article

**Deteksi molekuler mecA pada isolat klinis methycilin resistant Staphylococcus aureus (MRSA) dengan menggunakan teknik polymerase chain reaction (PCR) di RSUP Sanglah Denpasar**  
(<https://isainsmedis.id/index.php/ism/article/view/327>)

Putu Ayu Utami Prajawaty, Ni Nengah Dwi Fatmawati

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([HTTPS://ISAINSMEDIS.ID/INDEX.PHP/ISM/ARTICLE/VIEWFILE/327/213](https://isainsmedis.id/index.php/ism/article/viewfile/327/213))

**Gambaran penggunaan kontrasepsi hormonal dan non hormonal di wilayah kerja UPT Puskesmas Tampak Siring 1**  
(<https://isainsmedis.id/index.php/ism/article/view/301>)

Firdy Liwang, Agha Bhargah, I.B. Hendra Kusuma, Gede Giri Prathiwinda, I Gst Indaya Surya Putra, Luh Seri Ani

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([HTTPS://ISAINSMEDIS.ID/INDEX.PHP/ISM/ARTICLE/VIEWFILE/301/217](https://isainsmedis.id/index.php/ism/article/viewfile/301/217))

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**SYOK SEPTIK DISERTAI HIPOKSIA HEPATIK PADA RUMAH SAKIT UMUM DAERAH KLUNGKUNG, BALI-INDONESIA: SEBUAH LAPORAN KASUS**  
(<https://isainsmedis.id/index.php/ism/article/view/304>)

Putu Herdita Sudiantara, Juslaksmi Dharmapala

Online First: December 01, 2018

Research Article

**Ethanollic extract cream of red cabbage (*Brassica oleracea* L. var. capitata f.rubra) on the epidermal thickness in Wistar rats (*Rattus norvegicus*) after ultraviolet-B exposure**  
(<https://isainsmedis.id/index.php/ism/article/view/279>)

Yogarani V.C Rajappan, I Gusti Kamasan Arijana, I Wayan Sugiritama, IGA Dewi Ratnayanti

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(<http://dx.doi.org/10.15562/ism.v9i3.304>)

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Online First: December 01, 2018  
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Abstract (.pop-up-a-19) |

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(<HTTPS://ISAINSMEDIS.ID/INDEX.PHP/ISM/ARTICLE/VIEWFILE/279/273>)

Research Article

**Level of knowledge and attitude towards  
alzheimer`s disease among people in Sanglah  
General Hospital, Denpasar, Bali**  
(<https://isainsmedis.id/index.php/ism/article/view/280>)

Florence Diana Thomas, A.A. Bagus Ngurah Nuartha, I Putu  
Eka Widyadharma

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Abstract (.pop-up-a-20) |

PDF  
(<HTTPS://ISAINSMEDIS.ID/INDEX.PHP/ISM/ARTICLE/VIEWFILE/280/274>)

Research Article

**The ethanolic extract of red cabbage (*Brassica  
oleracea l. var, capitata f. rubra*) in cream  
preparation to the dermal-thickness of male  
Wistar mice (*Rattus norvegicus*) after Ultraviolet-  
B exposure**  
(<https://isainsmedis.id/index.php/ism/article/view/281>)

Gayathiri Mohana Krishnan, IG Kamasan Arijana, I Wayan  
Sugiritama

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Abstract (.pop-up-a-21) |

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([HTTPS://ISAINSMEDIS.ID/INDEX.PHP/ISM/ARTICLE/VIEWFILE/281/275](https://isainsmedis.id/index.php/ism/article/viewfile/281/275))

Research Article

**Level of awareness among female medical students towards risk factors of breast cancer at Faculty of Medicine, Udayana University, Bali, Indonesia**  
(<https://isainsmedis.id/index.php/ism/article/view/282>)

Daarshini Bhaskavan, Ni Nyoman Ayu Dewi, I Wayan Surudarma

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([HTTPS://ISAINSMEDIS.ID/INDEX.PHP/ISM/ARTICLE/VIEWFILE/282/276](https://isainsmedis.id/index.php/ism/article/viewfile/282/276))

Research Article

**Characteristic of thyroid carcinoma based on age, sex and histology type at Sanglah General Hospital, Bali, Indonesia, 2016**  
(<https://isainsmedis.id/index.php/ism/article/view/285>)

Kishan Arrumugam, Ni Putu Ekawati, I Made Gotra

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Abstract (.pop-up-a-23) |

PDF  
([HTTPS://ISAINSMEDIS.ID/INDEX.PHP/ISM/ARTICLE/VIEWFILE/285/277](https://isainsmedis.id/index.php/ism/article/viewfile/285/277))

Research Article

**The effect of red-cabbage (*Brassica oleracea* L.**

Research Article

**The effect of purple mangosteen (*Garcinia***

**var. capitata f. rubra) ethanolic extract in cream preparation on dermis-elastic fibre thickness in male Wistar rats after ultraviolet-B rays exposure**

**(<https://isainsmedis.id/index.php/ism/article/view/286>)**

Intan Syahirah Bt Abdul Rauap, I Wayan Sugiritama, Ni Made Linawati, I Gusti Kamasan Arijana

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(<http://dx.doi.org/10.15562/ism.v9i3.286>)

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Abstract (.pop-up-a-24) |

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(<HTTPS://ISAINSMEDIS.ID/INDEX.PHP/ISM/ARTICLE/VIEWFILE/286/278>)

**mangostana) peel extract on collagen fiber in male Wistar rats after Ultraviolet-B (UV-B) exposure**

**(<https://isainsmedis.id/index.php/ism/article/view/295>)**

Tarvin Jit Singh Gill, I Gusti Ayu Dewi Ratnayanti, I Gusti Kamasan Nyoman Arijana

Online First: December 01, 2018

| DOI:

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(<http://dx.doi.org/10.15562/ism.v9i3.295>)

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Abstract (.pop-up-a-25) |

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Review Article

**Intranasal premedication: special consideration in children**

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I Wayan Eka Arnawa

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**Peran sitokin dalam kerusakan saraf pada penyakit kusta: Tinjauan Pustaka**

**(<https://isainsmedis.id/index.php/ism/article/view/328>)**

I Gusti Nyoman Darmaputra, Putu Ayu Dewita Ganeswari

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10.15562/ism.v9i3.328  
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Abstract (.pop-up-a-27) |

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Review Article

## **Polusi udara terkait lalu lintas dan kesehatan respirasi**

(<https://isainsmedis.id/index.php/ism/article/view/303>)

I Gusti Ngurah Bagus Artana, Ida Bagus Ngurah Rai

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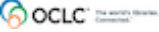

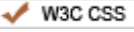

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# Deteksi molekuler *mecA* pada isolat klinis *methicilin resistant Staphylococcus aureus* (MRSA) dengan menggunakan teknik *polymerase chain reaction* (PCR) di RSUP Sanglah Denpasar

Putu Ayu Utami Prajawaty,<sup>1\*</sup> Ni Nengah Dwi Fatmawati<sup>2</sup>

## ABSTRACT

**Introduction:** MRSA is a bacteria that has experienced resistance to antibiotics, which generally has a function in killing *Staphylococcus aureus*, for the example *Methicillin*. In the worldwide MRSA prevalence is increasing, while the factors that cause the increase of the prevalence of MRSA is increasing the length of time of treatment in hospital, the misuse of antibiotics and poor infection control in the hospital. Laboratory tests were good and accurate were needed to identify MRSA as soon as possible so as to enable to conduct appropriate infection control. The aim of this study was to determine that the PCR can be used to confirm MRSA isolates.

**Methods:** This study used a cross sectional design on all isolated *Staphylococcus aureus* isolates from all clinical specimens examined at the Laboratory of Clinical Microbiology, Sanglah General Hospital, Denpasar from 2011 until 2012.

**Results:** A total of 38 samples were used, 32 (84.2%) positive *S. aureus* confirmed *mecA* genes using PCR technique. However, there are still 15.8% who are misidentified, where the possibility of the bacteria is not MRSA or the retrieval technique from the bacteria itself when conducting the research.

**Conclusion:** *MecA* gene examination using PCR method is an examination that can be used to detect MRSA bacteria.

**Keywords:** *Staphylococcus aureus*, *mecA*, PCR

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## ABSTRAK

**Latar Belakang:** *Methicilin resistant Staphylococcus aureus* (MRSA) merupakan bakteri yang telah mengalami resistensi terhadap antibiotik yang pada umumnya mempunyai fungsi di dalam membunuh *Staphylococcus aureus*, contohnya *Methicillin*. Prevalensi MRSA meningkat di seluruh dunia, adapun faktor yang menyebabkan terjadinya peningkatan dari prevalensi MRSA adalah bertambah lamanya waktu pengobatan di rumah sakit, penyalahgunaan antibiotika serta buruknya kontrol infeksi di rumah sakit. Perlunya pemeriksaan laboratorium yang baik serta akurat diperlukan untuk mengidentifikasi MRSA secepat mungkin sehingga memungkinkan untuk melakukan kontrol infeksi yang tepat. Tujuan dari penelitian ini adalah untuk mengetahui bahwa PCR (*polymerase chain reaction*) dapat digunakan untuk mengkonfirmasi isolate MRSA.

**Metode:** Penelitian ini menggunakan desain *cross sectional* pada seluruh isolat *Staphylococcus aureus* yang terisolasi dari semua spesimen klinis yang diperiksa di Laboratorium Mikrobiologi Klinik RSUP Sanglah Denpasar pada periode tahun 2011 hingga 2012.

**Hasil:** Total 38 sampel yang digunakan terdapat 32 (84,2%) *S. aureus* positif terkonfirmasi memiliki gen *mecA* dengan menggunakan teknik PCR. Namun masih terdapat 15,8% yang missidentifikasi, dimana disini kemungkinan bakteri tersebut bukan MRSA atau teknik pengambilan dari bakteri itu sendiri pada saat melakukan penelitian.

**Simpulan:** Pemeriksaan gen *mecA* menggunakan metode PCR merupakan pemeriksaan yang dapat digunakan untuk mendeteksi bakteri MRSA.

**Kata kunci:** *Staphylococcus aureus*, *mecA*, PCR.

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## PENDAHULUAN

*Staphylococcus aureus* merupakan patogen oportunistik yang dapat menyebabkan berbagai penyakit

infeksi, umum ditemukan pada kulit dan rongga hidung manusia. Salah satu patogen utama yang

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berkembang saat ini di dunia adalah *Methicillin-resistant Staphylococcus aureus* atau yang biasa disebut MRSA. *Methicillin-Resistant Staphylococcus aureus* (MRSA) adalah galur *Staphylococcus aureus* yang telah mengalami resistensi terhadap antibiotik yang pada umumnya mempunyai fungsi di dalam membunuh *Staphylococcus aureus*, contohnya *Methicillin*.<sup>1</sup> *Staphylococcus aureus* menghasilkan *Penicillin Binding Protein* (PBP2a atau PBP2') yang dikode oleh gen *mecA* yang memiliki afinitas rendah terhadap metisilin, yang merupakan kunci penyebab terjadinya resistensi ini. Hingga saat ini, MRSA terdeteksi dengan melakukan uji resistensi menggunakan disk Cefoxitin, yang masih bersifat skrining saja. Metode ini memerlukan isolat murni dan memerlukan waktu setidaknya 5 hari untuk tumbuhnya kultur bakteri.<sup>2</sup>

MRSA sendiri diketahui sebagai penyebab utama infeksi nosokomial yang menyebabkan berbagai infeksi mengancam nyawa, seperti *bacteremia*, *endocarditis*, infeksi luka dan radang paru-paru. Penyebaran Infeksi MRSA ini didapat dari rumah sakit dan fasilitas kesehatan lainnya. Karena penyebaran MRSA menimbulkan permasalahan infeksi pada rumah sakit dan terjadi antar rumah sakit, maka MRSA dalam hal ini sering disebut *Healthcare Associated MRSA* (HA-MRSA). Saat ini, penyebaran infeksi MRSA tidak hanya terbatas pada lingkup rumah sakit, namun juga terjadi pada orang-orang sehat diluar fasilitas layanan kesehatan yang disebut sebagai *community-associated MRSA* (CA-MRSA).<sup>3</sup>

Berdasarkan data *National Nosocomial Infections Surveillance Systems of Center for Disease Control and Prevention* di Amerika, pertumbuhan MRSA pada Agustus 2003, sekitar 57% merupakan isolasi dari *Staphylococcus aureus* dan merupakan *Health Care Associated infections* (HAIs) yang terjadi pada ruang ICU. Hal ini mengalami peningkatan dari laporan kejadian pada tahun 1995-1999 sekitar 35%-50%. Data atau publikasi terkait dengan MRSA di Indonesia sendiri tergolong masih sangat terbatas.<sup>4</sup>

Prevalensi MRSA saat ini ditemukan meningkat di seluruh dunia. Beberapa hal yang diduga menjadi penyebab peningkatan ini termasuk bertambah lamanya waktu pengobatan di rumah sakit, penyalahgunaan antibiotika termasuk fluoroquinolone serta buruknya kontrol infeksi di rumah sakit. Infeksi yang disebabkan oleh MRSA hanya bisa diobati dengan golongan antibiotik terbaru, seperti glycopeptide (Vancomycin), Linezolid dan Tigecycline, dimana antibiotik tersebut masih tergolong mahal sehingga menyebabkan pengobatan untuk MRSA pada negara berkembang menjadi sulit untuk diobati.<sup>4</sup>

Dalam rangka menekan morbiditas dan mortalitas yang khususnya disebabkan oleh MRSA, *The Institute for Healthcare Improvement* (IHI) mengembangkan suatu strategi kontrol yang mencakup: (1) kebersihan tangan, (2) dekontaminasi dari lingkungan dan peralatan, (3) budaya pengawasan aktif, dan (3) tindakan pencegahan kontak dengan pasien yang sudah terinfeksi dengan MRSA. Selain itu, *Health care-associated infections* (HAIs) mencetuskan beberapa teknik deteksi bakteri MRSA, salah satunya yang tergolong relatif terjangkau adalah dengan menggunakan metode pengawasan kultur tradisional. Namun, teknik ini membutuhkan waktu lebih lebih dari 24 jam untuk mengidentifikasi MRSA, dimana periode tersebut risiko penularan MRSA sebesar 5% sampai 15%, tergantung pada lokasi pasien.<sup>5</sup>

Metode molekuler real-time *polymerase chain reaction* (PCR) memberikan solusi untuk mengurangi waktu *turn around* dalam memberikan hasil. Saat ini metodologi PCR sudah disetujui oleh *Food and Drug Administration* (FDA) karena metode ini memungkinkan laporan siap dalam waktu 2 sampai 4 jam setelah *swab* diterima laboratorium, jauh lebih singkat dibandingkan dengan metode kultur tradisional, sehingga mampu menekan penularan MRSA *health care associated infections*. Gen *mecA* dianggap sebagai penanda molekuler yang sangat berguna pada galur MRSA.<sup>5</sup>

Melihat angka prevalensi dan besarnya pengaruh yang ditimbulkan oleh kejadian resistensi ini, sebuah pemeriksaan laboratorium yang baik serta akurat diperlukan untuk mengidentifikasi MRSA secepat mungkin sehingga memungkinkan untuk melakukan kontrol infeksi yang tepat, dalam hal ini, teknik PCR masih merupakan teknik yang lebih unggul dalam deteksi gen *mecA*, dibandingkan dengan kultur tradisional. Berdasarkan uraian di atas, serta dengan melihat masih sedikitnya penelitian terkait deteksi molekuler MRSA di Bali, suatu identifikasi yang cepat guna dalam mendeteksi gen *mecA* pada isolat klinis MRSA dengan teknik PCR perlu dilakukan.

## METODE PENELITIAN

Penelitian ini menggunakan metode penelitian deskriptif dengan desain *cross sectional* pada seluruh isolat *Staphylococcus aureus* yang terisolasi dari semua spesimen klinis yang diperiksa di Laboratorium Mikrobiologi Klinik RSUP Sanglah Denpasar. Penelitian ini bertujuan untuk mengetahui prevalensi isolat terduga MRSA yang diskriminasi dengan menggunakan disk cefoxitin terkonfirmasi MRSA dengan menggunakan teknik molekuler (PCR).



Kriteria inklusi dari penelitian ini yaitu semua isolat MRSA yang terisolasi dari spesimen klinis yang terisolasi periode 2 Februari 2011 hingga 4 Februari 2012 yang tersimpan dalam stok  $-80^{\circ}\text{C}$  RSUP Sanglah Denpasar, dan setiap isolat MRSA yang berasal dari 1 pasien (*non-duplicative sample*). Kriteria eksklusi dari penelitian ini yaitu stok MRSA yang tumbuh tidak murni pada *blood agar plate* setelah proses penumbuhan kembali. Pengerjaan PCR dilaksanakan di Laboratorium Biologi Molekuler FK UNUD, sementara pengerjaan penumbuhan stok isolat, pengerjaan isolasi DNA dan analisis data hasil penelitian dilaksanakan di Laboratorium Mikrobiologi Klinik FK UNUD.

Pengumpulan data dilaksanakan mulai dari bulan Februari hingga Oktober 2015. Teknik penentuan sampel dalam penelitian ini menggunakan teknik *convenient purposive sampling* dengan memakai isolat MRSA yang memenuhi kriteria inklusi, yaitu sejumlah 38 stok gliserol dari isolat MRSA. Data yang telah diperoleh akan diolah dengan menggunakan aplikasi *software* SPSS *version 21.0 for windows* dan kemudian hasilnya akan dianalisa secara deskriptif. Data akan disajikan dalam bentuk tabel, gambar, dan narasi.

## HASIL

Sebanyak 38 isolat MRSA yang digunakan pada penelitian ini merupakan isolat tahun 2011 – 2012 dari Laboratorium Mikrobiologi Klinik Rumah Sakit Umum Pusat Sanglah. Isolat disimpan pada suhu  $-80^{\circ}\text{C}$  dalam bentuk gliserol (konsentrasi akhir 35%). *Staphylococcus aureus* ATCC 25923 digunakan sebagai kontrol dari *Methicillin Sensitive Staphylococcus aureus* (MSSA), dimana *Escherichia coli* ATCC 25922 digunakan sebagai kontrol negatif. Isolat bakteri dikultur pada *blood agar media* (5% *Sheep Blood Agar*), dan plate bakteri di inkubasi pada suhu  $35^{\circ}\text{C}$  selama 18 – 24 jam secara aerob. Seluruh stok isolat gliserol *S.aureus* yang ditumbuhkan ditunjukkan pada [gambar 1](#).

## HASIL PCR

Duplex PCR menunjukkan amplifikasi 16s RNA dari gen *S.aureus* dan gen *mecA* sebagai penanda gen dari isolat MRSA. Siklus PCR dan produk PCR menunjukkan kesamaan dengan uniplex PCR. 16s RNA dari gen *S.aureus* (kemudian ditunjuk sebagai gen *S.aureus*) yang ditunjukkan pada 107 bp band, sedangkan untuk *mecA* pada 532 bp ([Gambar 2](#)).

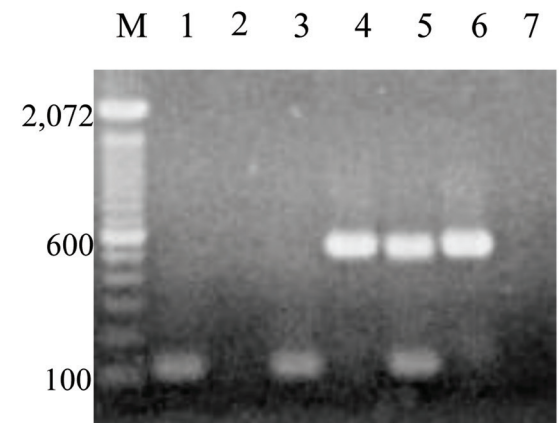
*S.aureus* ditunjukkan pada 118 bp, sedangkan *mecA* pada 532bp. Produk PCR dielektroforesis pada 1.5% gel agarose. (M, marker; Lane 1, gen *S.aureus* dari *S.aureus* ATCC 25923; Lane 2, PCR menggunakan primer gen *mecA* dari *S.aureus* ATCC 25923;

Lane 3, produk uniplex PCR gen *S.aureus* dari isolat klinis nomor 112; Lane 4, produk uniplex PCR gen *mecA* dari isolat klinis nomor 112; Lane 5, duplex PCR *S.aureus* dan *mecA* dari isolat klinis nomor 112; Lane 6, duplex PCR *S.aureus* dan *mecA* dari isolat klinis nomor 59; Lane 7, duplex PCR *S.aureus* dan *mecA* dari *E.coli* ATCC 25922 ([Tabel 1](#)).

Berdasarkan [tabel 1](#) dapat dilihat bahwa sebanyak 32 (84,2%) positif *S.aureus* serta membawa gen *mecA* sedangkan sebanyak 2 (5,3%) bukan merupakan *S.aureus* tetapi membawa gen *mecA*, serta sebanyak 4 (10,5%) sampel bukan merupakan *S.aureus* serta tidak membawa gen *mecA*.



**Gambar 1** Koloni dari *S.aureus* pada 5% Sheep Blood Agar



**Gambar 2** Uniplex dan Duplex PCR

**Tabel 1** Hasil Duplex PCR

		Gen <i>mecA</i>	
		Positif (n,%)	Negatif (n,%)
Gen 16s RNA	Positif (n,%)	32 (84,2%)	2 (5,3%)
	Negatif (n,%)	0	4 (10,5%)

## PEMBAHASAN

Penelitian ini berfokus pada penggunaan metode PCR yang digunakan untuk mengkonfirmasi isolat MRSA, dengan melihat amplifikasi dari gen *mecA* yang memiliki afinitas rendah terhadap metisilin.

Pada penelitian ini, kami menemukan sebanyak 32 sampel (84,2%) dari 38 sampel dinyatakan positif MRSA serta membawa gen *mecA*. Angka ini menunjukkan metode PCR memiliki sensitivitas yang cukup tinggi, tanpa menurunkan angka spesifitasnya. Apabila dibandingkan dengan metode konfirmasi uji aglutinasi lateks (*latex agglutination test*) yang juga mendeteksi berbagai *surface antigen*, teknik ini memiliki sensitivitas yang tinggi, namun menurunkan spesifitasnya karena adanya reaksi silang dengan CoNS (*Coagulase-negative Staphylococci*).

Penggunaan metode konfirmasi MRSA dengan metode PCR selain harga yang relatif lebih terjangkau dibandingkan metode uji aglutinasi lateks, metode konfirmasi menggunakan PCR juga membutuhkan waktu yang relatif lebih singkat dibandingkan uji aglutinasi lateks.

Penelitian sebelumnya telah menunjukkan kemampuan uji *real-time* PCR dalam mendeteksi MRSA secara cepat, dibandingkan dengan kultur. Penelitian sebelumnya melaporkan *assay* duplex untuk *mecA* dan fragmen *S. aureus* khusus sa442 genom menggunakan dipasangkan probe fret dengan Cyler Cahaya (Roche Diagnostics Corp, Indianapolis, Ind.) *Real-time PCR instrument*. Penelitian tersebut melaporkan sensitivitas sebesar 100% dan spesifitas untuk mendeteksi MRSA dari koloni murni. Elsayed dkk., menggunakan molekul berbasis *beacon real-time* PCR dupleks yang mengandung primer dan probe *beacon* molekuler untuk urutan dalam gen *mecA* dan gen *nuc S. aureus* spesifik. Para penulis turut menguji 181 galur, termasuk varian *S. aureus* sensitif- dan resisten- methicillin, *Staphylococcus* spp sensitif-methicillin dan tahan koagulase-negatif, dan bakteri nonstaphylococcus. Pada hasil dilaporkan sensitivitas dan spesifitas 100% untuk pengujian ini dalam mendeteksi dan membedakan *Staphylococcus* spp. dari galur murni isolat. Secara teoritis, spesimen lainnya (yaitu, luka, darah, dan perineum) dapat diuji secara langsung untuk kehadiran MRSA menggunakan pengujian ini, tetapi ini akan memerlukan validasi lebih lanjut.<sup>7,8</sup>

## SIMPULAN

Berdasarkan hasil penelitian ini, dari 38 sampel yang digunakan terdapat 32 (84,2%) *S. aureus*

positif terkonfirmasi memiliki gen *mecA* dengan menggunakan teknik PCR. Namun masih terdapat 15,8% yang missidentifikasi, dimana disini kemungkinan bakteri tersebut bukan MRSA atau teknik pengambilan dari bakteri itu sendiri pada saat melakukan penelitian.

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## KONFLIK KEPENTINGAN

Penulis menyatakan tidak memiliki konflik kepentingan dalam penelitian dan publikasi ini.

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