Journal of Applied Pharmaceutical Science Vol. 14(11), pp 062-070, November, 2024
Available online at http://www.japsonline.com
DOI: 10.7324/JAPS.2024.194102
ISSN 2231-3354

Cost-effectiveness analysis of several dosage regimens of vancomycin in ventilator-associated pneumonia critically ill patients

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ARTICLE HISTORY

Received on: 12/05/2024
Accepted on: 01/09/2024
Available Online: 20/10/2024

Key words:
Cost-effectiveness analysis, methicillin-resistant *Staphylococcus aureus*, Monte Carlo simulation, vancomycin, ventilator-associated pneumonia.

ABSTRACT

This study aimed to identify the most cost-effective vancomycin dosage regimen to treat ventilator-associated pneumonia (VAP) in critically ill patients infected with "minimum inhibitory concentration (MIC) Creep" Methicillin-resistant *Staphylococcus aureus* (MRSA). Decision tree analysis with a healthcare provider perspective was used in this study. Clinical data, both efficacy and safety, were derived from Monte Carlo Simulation (MCS). Only direct medical cost was calculated in this study without any discounting factor analysis. The most cost-effective dosage regimen is the dosage regimen with the lowest incremental cost-effectiveness ratio (ICER). MCS found that the standard dose of vancomycin (2 g/day) was ineffective in treating MRSA with MIC 2 mg/l. The dosage regimen with a total daily dose of 4 g afforded the highest efficacy for all MIC values of MRSA. Nevertheless, this dosage regimen also afforded the highest risk of nephrotoxicity. The dosage regimen with a total daily dose of 3 g vancomycin attained a relatively good efficacy and safety profile. The ICER for vancomycin 1 g every 8 hours, 1 g every 6 hours, 1.5 g every 12 hours, and 2 g every 12 hours were 50,464; 58,998; 49,809; and 57,153, respectively. Vancomycin 1.5 g every 12 hours was the most cost-effective dosage regimen to treat VAP patients without advanced renal impairment in the era of "MIC Creep" MRSA.

INTRODUCTION

Ventilator-associated pneumonia (VAP), defined as pneumonia that occurs more than 48–72 hours after endotracheal intubation, is one of the most common infections found in the hospital, especially in the intensive care unit (ICU) setting [1–4]. Methicillin-resistant *Staphylococcus aureus* (MRSA) has been identified as a common pathogen causing VAP [1,2,5]. Compared with the methicillin-susceptible strain, infection caused by MRSA afforded the worst outcome, i.e., higher mortality and cost of treatment [6–9]. Therefore, adequate management of MRSA infection should be ensured as early as possible after the infection has been recognized to prevent the occurrence of these worst outcomes.

Vancomycin has long been used as an antibiotic to treat MRSA infection. The American Thoracic Society guideline and the newest guideline from the Infectious Diseases Society of America (IDSA) recommended vancomycin as the core antibiotic for various types of infection caused by MRSA, including VAP [2,10]. The effectiveness of vancomycin treatment will be significantly determined by the achievement of pharmacokinetics-pharmacodynamic (PK-PD) indices, i.e., the area under the plasma drug concentration and time curve for 24 hours over minimum inhibitory concentration (AUC24/MIC) ≥400 mg.hour/l [10–12]. A greater proportion of patients who achieved these PK-PD indices received successful treatment in 30-day survival. Achieving this desired treatment target is challenging, especially in the era where the MIC value of MRSA strain has been shifted to a higher number even though it is still in the susceptible breakpoint value range ≤2 mg/l [13–15]. This

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phenomenon is also known as the "MIC Creep" phenomenon. Two recent meta-analysis revealed that high MIC value afforded high mortality events and treatment failure [16,17]. This finding emphasized the need to adjust the vancomycin dosage regimen to manage MRSA infection.

The need for dosage regimen adjustment is even more needed when vancomycin is used to treat MRSA infection among critically ill patients who are usually admitted to the ICU. Different physiological conditions among these patients may impact the different PK parameter profiles that, finally, may impact the achievement of AUC24/MIC [18,19]. Revilla *et al.* [20] found that a higher dose of vancomycin is needed to treat *Staphylococcus aureus* infection for critically ill patients with better renal function (Cl_{cr} >60 ml/minute). Meanwhile, for patients with worse renal function (Cl_{cr} <60 ml/minute), the standard vancomycin dose, defined as 1 g every 12 hours, might still be effectively used [20]. Accumulation of vancomycin would increase the total concentration of vancomycin in the body, which finally increases the value of AUC24.

One frightening factor of using high doses of vancomycin is the risk of nephrotoxicity. Lodise *et al.* [21] emphasized that a dose of vancomycin as high as 4 g/day might be possible for patients with a relatively tolerable risk of nephrotoxicity. Nephrotoxicity can cause a higher risk of in-hospital mortality, longer hospital stays, longer ICU stays, and increased health care costs [22,23]. Accumulation of vancomycin in the proximal tubular cells of renal leading to cell necrosis was postulated as the mechanism of vancomycin-induced nephrotoxicity [22–24]. Incidence of vancomycin-induced nephrotoxicity has been differently reported, ranging from 5% to 35%, and vancomycin trough level of ≥15 mg/l was documented as one of the risk factors of vancomycin-induced nephrotoxicity [24–29]. Conversely, this trough concentration was also recommended to ensure the achievement of desired PK-PD indices, particularly for deep-sited infections like VAP [10].

Because the MIC Creep MRSA phenomenon occurred in the last decades, we hypothesized that standard doses of vancomycin might not be effectively used to treat MRSA infection and a higher dose of vancomycin was needed. High doses of vancomycin, up to 4 g/day, could be given to the patients. Different vancomycin dosage regimens afford different efficacy and safety profiles. These different vancomycin dosage regimens might also influence the cost of the therapy that patients need to cover, including the risk of nephrotoxicity with higher doses that can cause additional cost burdens to the patients. At the time of this study being conducted, no literature could be used as the scientific foundation to address the clinical question about which vancomycin dosage regimen should be administered to treat MRSA infection in the era of "MIC creep". Therefore, the aim was to identify the most cost-effective dosage regimen of vancomycin for VAP critically ill patients who were infected with "MIC Creep" MRSA.

MATERIAL AND METHODS

Cost-effectiveness model

This study conducted a simulation of the cost-effectiveness of several vancomycin dosage regimens for VAP critically ill patients infected with MRSA in this study using the decision tree model. It was a probabilistic study, meaning that the probability of the event, both clinical effectiveness and failure, in the decision tree model was not a fixed value. The model compared two different dosage regimens of vancomycin and a standard vancomycin dosing regimen, i.e., 1 g every 12 hours, was used as a standard comparator. The outcomes for each comparison were: 1) treatment successful of 30-day survival (indicated by the achievement of AUC24/MIC ≥ 400), and 2) treatment failure due to nephrotoxicity (indicated by the achievement of AUC24 >1,300). Since the most cost-effective dosage regimen of vancomycin was intended, a choice of changing to other antibiotics with MRSA coverage, such as linezolid, daptomycin, ceftaroline, ceftobiprole, and quinupristin-dalfopristin was not provided in our model. Figure 1 presents the decision model used in this study. The assumptions used in this study are listed below:

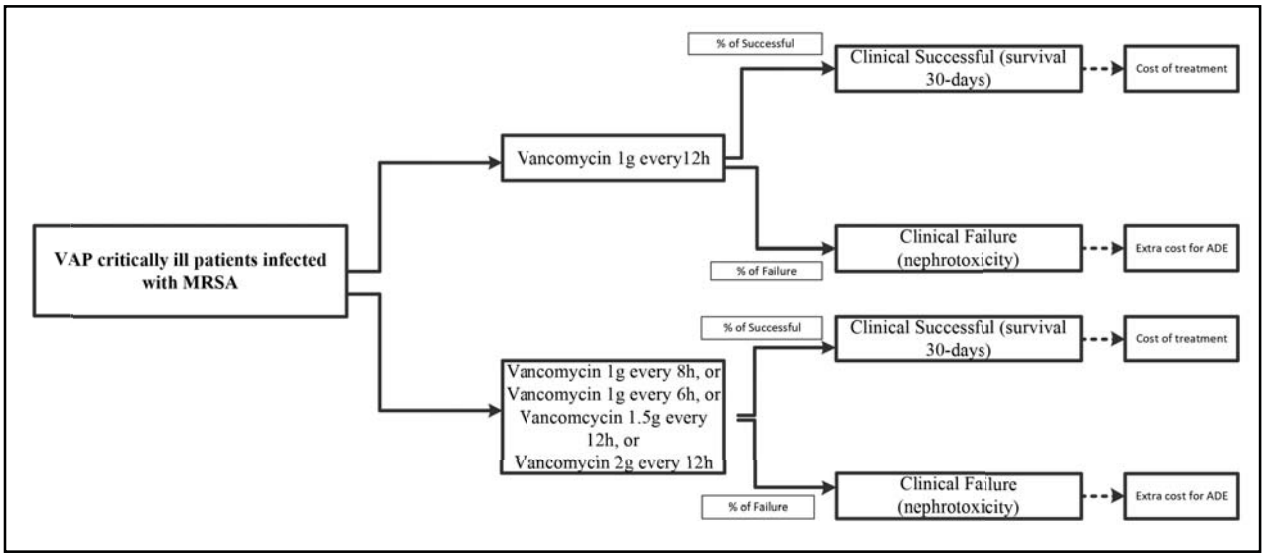

Figure 1. Decision tree model for vancomycin treatment in ventilator-associated pneumonia infected with MRSA.

1. Critically ill patients simulated in our model were those without severe renal impairment, defined as patients with creatinine clearance (CLCr) 60–120 mg/dl,
2. MRSA strains were classified as vancomycin-susceptible MRSA, defined as strains with MIC ≤ 2 mg/l,
3. Regardless of different dosage regimens, the duration was 11 days.

Perspective, time horizon, and discounting

The cost-effectiveness analysis was conducted from the perspective of the healthcare provider. VAP was generally classified as an acute disease; therefore, it might not be relevant to consider long-term complications. A 30-day survival rate was used in the analysis and no discounting method was applied to any cost.

Clinical data for simulation

Clinical data, both efficacy and safety data, were attained by Monte Carlo Simulation (MCS). A detailed explanation of each data required in the simulation is provided below:

a. Population PK parameters

Vancomycin was classified as a hydrophilic antibiotic with a main elimination process by glomerulus filtration. Volume distribution (Vd) and CLCr are essential in determining the body's vancomycin concentrations. Vd and CLCr in this study were quantified using a valid and reliable PK model equation derived from a published population PK study among critically ill patients [20]. The final PK model equations from that study are listed below:

$$CL = \theta 1 \times CLCr + Age^{\theta 2} \quad \text{..... (1)}$$

CL stands for vancomycin clearance (ml/minute/kg) and CLCr stands for creatinine clearance (ml/minute/kg). The unit for age is years old.

$$Vd = \theta 3 \times \theta 4 \quad \text{..... (2)}$$

Vd stands for Vd (L). The values of θ1, θ2, θ3, and θ4 were 0.67, −0.24, 0.82, and 2.49, respectively.

b. MIC distribution

This study applied MIC distribution data from The European Committee on Antimicrobial Susceptibility Testing (EUCAST) [30]. There were three different values of MIC used in the analysis, i.e., 0.5, 1, and 2 mg/l, and the distribution of MRSA at each MIC value at the time of analysis being conducted can be found in Supplementary file Table 1.

c. PK-PD simulation of several doses of vancomycin

MCS with 5,000 replications was used to simulate the efficacy and safety of several vancomycin dosage regimens using Crystal Ball® 2000 (Decisioneering Inc., Denver, CO). Each simulated patient was created by a random assignment of several patients' characteristics, including age, weight, and CLcr. The concentration of vancomycin each time during and post-infusion was calculated to calculate the AUC24. Since Revilla *et al.* [20] used a one-compartment model in their study and most vancomycin concentration was measured after the 5th dose, a one-compartment steady state condition intermittent infusion equation was used to calculate the concentration during the infusion time.

$$C = [k_0/(k_e V_d)](1-e^{-ket'})/(1- e^{-ke\tau})] \quad \text{..... (3) [31]}$$

K_0 stands for infusion rate (dose of vancomycin divided by duration of infusion; mg/hour); k_e = elimination constant ($hour^{-1}$); V_d = volume of distribution (L); *t'* = time of infusion (hour); *n* = number of dose given; τ = dosing interval (hour).

While the equation to calculate concentration after stopping the infusion was [31]:

$$C = C_{end} \cdot e^{-ke.t} \quad \text{..... (4)}$$

C_{end} stands for concentration at the end of infusion; *t* = time after stopping infusion (hour).

The AUC during and post-infusion time was calculated using the linear trapezoidal (lin trap) rule [32]:

$$\text{Lin trap AUC} = \{(C_1+C_2)/1\} \times (t_2 - t_1) \quad \text{..... (5)}$$

C_1 stands for concentration at time 1; C_2 = concentration at time 2.

Five different vancomycin dosage regimens were simulated in this study, including 1 g every 12 hours, 1 g every 8 hours, 1 g every 6 hours, 1 g every 12 hours, and 2 g every 12 hours.

Analysis of the PK-PD model

Efficacy

The efficacy of a particular dosage regimen of vancomycin was presented as the probability of target attainment (PTA) and cumulative fraction response (CFR).

• The PTA is the probability of AUC24/MIC ≥400 mg.hour/l being achieved by giving a particular vancomycin dosage regimen at a specific MIC value [33]. Each vancomycin dosage regimen afforded some percentage of PTA for three different MIC values. Below is the equation used to calculate the PTA.

$$PTA = \frac{\text{Number of achievement desired AUC24/MIC}}{5{,}000} \times 100\% \quad \text{.... (6)}$$

This study simulated 5 dosage regimens of vancomycin for 3 different values of MIC, and 15 different PTAs at the end of the study. Five dosage regimens simulated in this study included 1 g every 12 hours, 1 g every 8 hours, 1 g every 6 hours, 1.5 g every 12 hours, and 2 g every 12 hours. The main consideration in choosing the dosage regimens was related to the efficacy and safety profile attained by administering certain dosage regimens. The standard dosage regimen of vancomycin was 1 g every 12 hours, as also recommended in the IDSA guidelines [10]. Therefore, 1 g every 12 hours was used as the lowest dosage regimen in this study. Furthermore, the highest

vancomycin dosage regimen found in the literature was 4 g/day, and this was also used as the highest dosage regimen in this study [29].

• CFR was defined as the expected population PTA for a specific vancomycin dosage regimen against the distribution of MRSA with different MIC values [33].

CFR of particular dosage regimen = (PTA for MIC 0.5 mg/l × percentage of MRSA with MIC 0.5 mg/l) + (PTA for MIC 1 mg/l × percentage of MRSA with MIC 1 mg/l) + (PTA for MIC 2mg/l × percentage of MRSA with MIC 2 mg/l)..... (7).

Since this study simulated five dosage regimens of vancomycin, five different CFRs were presented at the end of this study.

Safety

Several studies have proven the association between vancomycin trough concentration of 15 mg/l and the risk of nephrotoxicity; however, it was debatable to use trough concentration as a suitable predictor of vancomycin-induced nephrotoxicity. Lodise *et al.* [21] found a higher percentage of nephrotoxicity in patients with AUC24 at steady state condition >1,300 mg.hour/l. Overall, 4.2% of patients with AUC24 >1,300 mg.hour/l developed nephrotoxicity. Therefore, AUC24 >1,300 mg.hour/l was used as the predictor of nephrotoxicity in this study.

Cost data for simulation

Only direct medical costs were counted in this study and expressed in Thai Bath. Direct cost is defined as the cost of the drug and any supporting material needed to administer the drug. There were several vancomycin products in Thailand. The chosen product in this study referred to the product used in a referral hospital in Thailand. The information about the material needed to administer the vancomycin was derived from a pharmacist who worked in a referral general hospital in Thailand and was supported with a reference [34]. The price of vancomycin and each supporting material was referred to the price list data recommended by the Health Intervention and Technology Assessment Program [35] Thailand and Drug Management System Information Centre (Supplementary file Table 2) [36]. When the analysis was conducted, the price for vancomycin was 131.3 Bath per vial of 500 mg vancomycin. Furthermore, the additional cost to manage nephrotoxicity adverse events was US$ 2,500, which was further adjusted in Thai Bath [36].

Each supporting material was used for a different number of days. The duration of using the infusion set, syringe, infusion pump, water for injection, and fluid for infusion was the same as the duration of the vancomycin prescription [37–41]. The number of creatinine monitoring and therapeutic drug monitoring of vancomycin referred to the mean number of measurements used in the published study [38,40]. The total hospital stay was approximately 20 days and the ICU stay was 16 days [41]. The cost for the physician was the same for a total of 20 days [41]. In contrast, the cost of nurse services differed between the ICU and general wards. Therefore, ICU nurse services were multiplied by 16 days and general ward nurse services were multiplied by 4 days. Detailed duration of utilization for the drug, each supporting material, and hospital length of stay were presented in the Supplementary file Table 3.

Analysis of the cost-effectiveness model

The decision tree analysis was analyzed by using the path probability method. The clinical success for particular vancomycin dosage regimens was defined as the probability of 30-day survival.

- The probability of 30 days survival was calculated by multiplying the CFR for that particular vancomycin dosage regimen with the percentage of patients who survived when AUC24/MIC achieved ≥ 400 mg.hour/l. Moise-Broder *et al.* [12] found that 61% of patients survived when AUC24/MIC achieved ≥400 mg.hour/l.
- The expected cost for 30 days of survival was derived from the probability of 30 days of survival multiplied by the total direct cost.
- The probability of nephrotoxicity was calculated by multiplying the percentage of patients with AUC24 at steady state condition >1,300 with the incidence of nephrotoxicity. Lodise *et al.* [21] found that 4.2% of patients with AUC >1,300 got nephrotoxicity due to vancomycin.
- The expected cost for nephrotoxicity was derived from the probability of nephrotoxicity multiplied by the additional cost for nephrotoxicity [39].
- The expected cost for 30-day survival was added to the expected cost for nephrotoxicity management, and the result reflected the total expected cost for a particular dosage regimen of vancomycin. Finally, the total expected cost was used to calculate the incremental cost-effectiveness ratio (ICER).

$$ICER = \frac{\text{Total expected cost dosage regimen X – Total expected cost vancomycin 1 g q 12 hours}}{\text{Clinical successful dosage regimen X – Clinical successful vancomycin 1 g q12 hours}}$$

Four ICERs were resulted at the end of this study and the lowest ICER was recommended as the most cost-effective dosage regimen of vancomycin.

Sensitivity analysis

The distribution of MIC plays an important role in achieving desired PK-PD indices. Since the MIC distribution in this study was derived from EUCAST, it might not always reflect the MIC distribution data in different settings. Therefore, sensitivity analysis was conducted by changing the proportion of strain with a particular MIC. Initially,

the best scenario was set in which all MRSA strains were MIC 0.5 mg/l. Then, the proportion of MIC 0.5 mg/l was decreased by 10% and the proportion of MIC 1.0 mg/l was increased by 7.5%. The rest 2.5% incremental was for the strain with MIC 2 mg/l. After achieving proportions 0%, 75%, and 25% for the strain with MIC 0.5, 1.0, and 2.0 mg/l, respectively, the proportion of MIC 0.5 mg/l was held at 0% and the proportion of MIC 2 mg/l was increased by 5%. The proportion of MIC 1.0 mg/l was set to make the total proportion 100%.

RESULTS

MCS, using 5,000 replications, resulted in several PTAs and CFRs. The PTAs and CFRs of several vancomycin dosage regimens were presented in Tables 1 and 2, respectively. According to the data in Table 1, it was clearly shown that only vancomycin with a total daily dose of 4 g, either given as 1 g every 6 hours or 2 every 12 hours, could cover MRSA with MIC 2 mg/l. The results of the PTA calculation were multiplied by the proportion of MRSA with a particular MIC to get the CFRs. With the proportion of MIC of MRSA as presented in the Supplementary file Table 1, only vancomycin with a total dose of 4 g/day afforded acceptable CFR (≥ 90%). A total daily dose of vancomycin 4 g/day, either given as 1 g every 6 hours or 2 g every 12 hours, also afforded a higher risk of nephrotoxicity. Table 2 presents the probability of nephrotoxicity from several dosage regimens of vancomycin.

Giving vancomycin as 1 g every 6 hours regimen and standard dosage regimen afforded the highest and lowest total direct medical cost, i.e., 42,037.74686 and 34,676.36774 Thai Bath, respectively. The total direct cost for 1 g every 8 hours, 1.5 g every 12 hours, and 2 g every 12 hours were 38,357.0573; 38,027.0573; and 41,377.74686 Thai Bath, respectively. For any given dosage regimen, whenever nephrotoxicity occurs, the additional cost for nephrotoxicity management was 137,610.5795 Thai Bath. Table 3 presents the expected cost for 30 days survival, the expected cost for nephrotoxicity, and the total expected cost.

ICER analysis revealed that 1.5 g of vancomycin every 12 hours dosage regimen was the most cost-effective. Detailed information for ICER can be found in Table 4. Results of sensitivity analysis (Table 5) emphasized that vancomycin 1.5 g every 12 hours was the most cost-effective compared with other dosage regimens for different proportions of MIC of MRSA. In the best scenario analysis, i.e., all MRSA strains have MIC 0.5 mg/l, the ICER analysis revealed that vancomycin 1 g every 12 hours was dominant compared with any other dosage regimen. The difference in ICER value between the total daily dose of 3 g versus 4 g became lesser when the proportion of MRSA with higher MIC increased.

Table 1. PTA for several dosage regimens of vancomycin.

MIC (mg/l)	Van 1 g q 12 hours	Van 1 g q 8 hours	Van 1 g q 6 hours	Van 1.5 g q 12 hours	Van 2 g q 12 hours
0.5	100	100	100	100	100
1.0	100	100	100	100	100
2.0	0	47.12	94.14	44.08	93.34

Notes, q in the dosing regimens means “every”, van = vancomycin.

Table 4. ICER of several vancomycin dosage regimens.

ICER 1 g every 8 hours versus 1 g every 12 hours	50,464.16808
ICER 1 g every 6 hours versus 1 g every 12 hours	58,998.95852
ICER 1.5 g every 12 hours versus 1 g every 12 hours	49,809.89424
ICER 2 g every 12 hours versus 1 g every 12 hours	57,153.78678

Table 2. CFR, probability of 30 days survival, and probability of nephrotoxicity of several vancomycin dosage regimens.

Dose of vancomycin	MIC of MRSA (mg/l)				Probability of 30 days survival	Probability of nephrotoxicity
	0.5	1	2	CFR (%)		
1g q 12	0.24	60.35	0	60.59	0.369599	0
1g q 8	0.24	60.35	18.428632	79.018632	0.482013655	0
1g q 6	0.24	60.35	36.818154	97.408154	0.594189739	0.0079044
1.5g q 12	0.24	60.35	17.239688	77.829688	0.474761097	0
2g q 12	0.24	60.35	36.505274	97.095274	0.592281171	0.0075264

Notes, q in the dosing regimens means “every”.

Table 3. The expected cost for 30 days of survival, the expected cost for nephrotoxicity, and the total expected cost.

	1 g every 12 hours	1 g every 8 hours	1 g every 6 hours	1.5 g every 12 hours	2 g every 12 hours
Expected cost 30 days survival	12,816.35084	18,486.60569	24,976.30692	18,051.52016	24,505.9292
Treatment cost for treatment failure	0	0	1,087.729065	0	1,035.712266
Total expected cost	12,816.35084	18,486.60569	26,064.03599	18,051.52016	25,541.64147

Table 5. ICER for the sensitivity analysis.

Proportion of MIC (%)			ICER			
0.5 mg/l	1.0 mg/l	2.0 mg/l	1 g q 8 versus 1 g q 12	1 g q 6 versus 1 g q 12	1.5 g q 12 versus 1 g q 12	2 g q 12 versus 1 g q 12
100	0	0	Dominant	Dominant	Dominant	Dominant
90	7.5	2.5	342,998.1712	471,209.6905	334,480.9884	440,660.7624
80	15	5	186,771.9589	252,713.9146	182,453.3314	237,429,4865
70	22.5	7.5	134,696.5548	179,881.9893	131,777.4458	169,685.7279
60	30	10	108,658.8528	143,466.0267	106,439.503	135,813.8486
50	37.5	12.5	93,036.23158	121,616.4491	912,36.73725	115,490.721
40	45	15	82,621.15077	107,050.064	81,101.56012	101,941.9693
30	52.5	17.5	75,181.80733	96,645.50325	73,862.14788	92,264.28945
20	60	20	69,602.29975	88,842.08268	68,432.5887	85,006.0296
10	67.5	22.5	65,262.68274	82,772.75557	64,209.59823	79,360.71638
0	75	25	61,790.98914	77,917.29388	60,831.20585	74,844.46581
0	70	30	58,950.51255	73,944.64341	58,067.06663	71,149.3517
0	65	35	56,583.44873	70,634.10135	55,763.61729	68,070.08994
0	60	40	52,863.77701	65,431.82098	52,143.91117	63,231.25004
0	55	45	50,074.02322	61,530.11069	49,429.13158	59,602.12011
0	50	50	47,904.21472	58,495.44714	47,317.63634	56,779.4635
0	45	55	46,168.36791	56,067.71629	45,628.44015	54,521.33822
0	40	60	44,748.12962	54,081.39106	44,246.37054	52,673.78116
0	35	65	43,564.59771	52,426.12003	43,094.64587	51,134.15029
0	30	70	42,563.14763	51,025.50608	42,120.10961	49,831.3857
0	25	75	41,704.76185	49,824.97984	41,284.79281	48,714.73033
0	20	80	40,960.82751	48,784.52376	40,560.85159	47,746.96235
0	15	85	40,309.88496	47,874.1247	39,927.40301	46,900.16537
0	10	90	39,735.52388	47,070.8314	39,368.47781	46,152.99156
0	5	95	39,224.9807	46,356.79292	38,871.6554	45,488.83707
0	0	100	38,357.0573	45,142.9275	38,027.,0573	44,359.77442

DISCUSSION

This study was the first to identify the most cost-effective treatment for managing VAP in critically ill populations, considering several vancomycin dosage regimens' efficacy and safety profiles. Findings on the potential of achieving desirable outcomes by increasing the dose of vancomycin would provide important guidance for clinicians in settings where no other antibiotics with MRSA coverage have been listed in the national formulary, such as in Indonesia. It should be acknowledged that linezolid might be considered the first choice therapy recommended to manage MRSA in VAP as it has excellent tissue penetration into the lung based on existing published literature. Several previously published studies indicated the superiority of linezolid compared to vancomycin in managing VAP patients with MRSA [42–46]. However, it is worth noting that the efficacy was compared by incorporating a standard dose of vancomycin, i.e., 2 g/day [23, 45, 47–49]. Our study found that vancomycin could still be a promising agent for treating MRSA infection, a finding similar to the study by Niederman *et al.* [50]. Dose incremental according to MIC value is the key to maintaining the efficacy of vancomycin against MRSA and, therefore, MIC should be identified before deciding the appropriate treatment. Linezolid could be prescribed for more complex indications, including 1) patients who could not tolerate vancomycin, 2) patients who were infected with vancomycin-intermediate *Staphylococcus aureus* and vancomycin-resistant *Staphylococcus aureus*, and 3) patients with pre-existing renal disease.

We found vancomycin 1.5 g given every 12 hours to be the most cost-effective dosage regimen. This dosage regimen was higher than the most frequently prescribed dose of vancomycin, i.e., 1 g every 12 hours. This finding is similar to several published studies that have proposed a higher dose of vancomycin [42,51]. Chung *et al.* [42] conducted a study

among critically ill patients with pneumonia in Korea. They emphasized the need for an incremental vancomycin dose, particularly in critically ill patients with CLCr ≥60 ml/minute [42]. Another study by Jeurissen *et al.* [51] suggested prescribing vancomycin 3 g/day for critically ill patients with normal renal function based on a retrospective study of the relationship between CLCr and vancomycin clearance. Our finding was in line with the recommendation from Jeurissen *et al.* [51] with the additional economic evaluation incorporating the percentage efficacy and safety of several vancomycin dosage regimens. Our recommendation also did not contradict the findings of Lodise *et al.* [29] who suggested that vancomycin should be given less than 4 g/day to minimize the risk of nephrotoxicity.

Vancomycin 1.5 g given every 12 hours might not only offer an advantage in the clinical outcome of the patients but also might prevent the development of further resistant mechanisms. Two *in-vitro* studies revealed a higher number of AUC24/MIC afforded prevention from developing further resistant strains and a higher rate of MRSA eradication [52,53]. The first *in-vitro* study by Zelenitsky *et al.* [53] found that the higher AUC24/MIC value afforded a lower percentage of strain with reduced susceptibility to vancomycin. There were 31% strains with reduced vancomycin susceptibility (characterized with MIC ≥3 mg/l) when fAUC24/MIC ≤120 mg.hour/l was attained, while only 5% when the fAUC24/MIC was at ≥240 mg.hour/l (p = 0.003). Since vancomycin, usually defined as has 50% of protein binding, the value of fAUC24/MIC 120 and 240 mg.hour/l is the same with total AUC24/MIC 240 and 480 mg.hour/l, respectively. Moreover, no strain with reduced vancomycin susceptibility was found with the fAUC24/MIC between 480 and 960 mg.hour/l equals the total AUC24/MIC 960–1,920 mg.hour/l. The second *in-vitro* study also reported a similar finding. The fAUC24/MIC as high as 225 mg. hour/l afforded strain with lower MIC and less mean cell wall thickening than lower fAUC24/MIC [52]. A thicker cell wall is one characteristic of resistant strain [52]. These studies pointed out an important concept, i.e., the lower AUC24/MIC may afford a greater chance to develop further resistant strains of MRSA. The development of further resistant strains will impact the unfavorable treatment outcome and the economic burden on society.

Results from the sensitivity analysis emphasized better coverage of MRSA activity in a higher total daily dosage regimen when the proportion of higher MIC of MRSA increased. The ICER differences between the total daily dose of 3 g versus 4 g became narrow following the increase in the proportion of higher MIC of MRSA. For any proportion of MIC value, the total daily dose of 3 g was more cost-effective than the total daily dose of 4 g. This result was afforded because of the different risks of nephrotoxicity between these regimens. Even though a total daily dose of 4 g afforded higher efficacy than 3 g/day, this regimen also had a higher risk of nephrotoxicity. This study found no nephrotoxicity risk from a total daily dose of 3 g. The higher cost of a total daily dose of 4 g resulted from the additional cost of managing nephrotoxicity adverse events that would not be found in the 3 g/day dosage regimen. Therefore, this study never found a dosage regimen of 4 g/day more cost-effective than 3 g/day.

In our study, the ICER was calculated according to direct medical cost only, including the cost of products, supporting materials, physician and nurse fees, and additional costs to manage the adverse event of nephrotoxicity. This study did not consider productivity loss as the cost component in the ICER analysis, as commonly found in studies with chronic diseases (such as diabetes and Chronic Obstructive Pulmonary Disorder (COPD) [54,55]. It should be noted that, in general, VAP might not always result in severe morbidity as compared with other degenerative diseases such as diabetes and COPD. Survival was referred to as one of the fundamental goals when treating patients with VAP. Future studies might consider the economic burden of mortality rate and productivity loss, particularly if a high mortality rate occurs among people in their productive age.

The findings in our study should be interpreted with caution because of some limitations. First, our recommendation might not apply to this population since we used an assumption for patients without advanced renal impairment. Vancomycin is usually prescribed every alternate day for patients with advanced renal impairment. Second, the cost-effectiveness of a dosage regimen of 1.5 g every 12 hours in our study might be overestimated because of the same duration of treatment regardless of the total daily dose. Since different dosage regimens afforded different efficacy profiles, it would be possible that a shorter duration of treatment is needed by giving a higher vancomycin dosage regimen. Third, the nephrotoxicity from vancomycin with a total daily dose of 3 g might be underestimated because we just incorporated one cut-off point, i.e., AUC >1,300 mg.hour/l. Unfortunately, at the time of the analysis, we could not find other studies that revealed the association between AUC and risk nephrotoxicity. We also did not relate the duration of vancomycin treatment with the risk of nephrotoxicity. In this study, the discount rate was not considered in the analysis of the Montecarlo simulation for direct medical costs; therefore, the finding of our simulation might not always be relevant in all situations in the future. Finally, we did not consider other important factors that might influence the total expected cost, such as the severity of VAP, underlying condition, and comorbid condition. Finally, clinical studies are required to justify our recommendation.

CONCLUSION

This probabilistic simulated cost-effectiveness study suggested that vancomycin 1.5 g given every 12 hours is the most cost-effective dosage to treat VAP patients infected with "MIC Creep" MRSA. However, this cost-effective dosage regimen could not be generalized for all conditions and settings, as it might be influenced by renal function and comorbidities status. In the hospitals where most MRSA strains have MIC 0.5 mg/l, the standard dose of vancomycin might still be effective in treating MRSA infections. Patients without deep-site infection, such as urinary tract infection caused by MRSA, might not necessarily prescribed a higher dose of vancomycin.

AUTHOR CONTRIBUTIONS

Concept and design: ES, SVH, BP. Data acquisition: ES, SVH. Data analysis/interpretation: ES. Drafting

manuscript: ES. Critical revision of manuscript: SVH, BP. Statistical analysis: ES, BP. All authors have read and agreed to the published version of the manuscript.

FINANCIAL SUPPORT

There is no source of funding for this study.

CONFLICTS OF INTEREST

The authors report no financial or any other conflicts of interest in this work.

ETHICAL APPROVALS

This study does not involve experiments on animals or human subjects.

DATA AVAILABILITY

All data generated and analyzed are included in this research article.

SUPPLEMENTARY MATERIAL

The supplementary material can be accessed at the journal's website: Link here [https://japsonline.com/admin/php/uploadss/4358_pdf.pdf].

PUBLISHER'S NOTE

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USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

The authors declares that they have not used artificial intelligence (AI)-tools for writing and editing of the manuscript, and no images were manipulated using AI.

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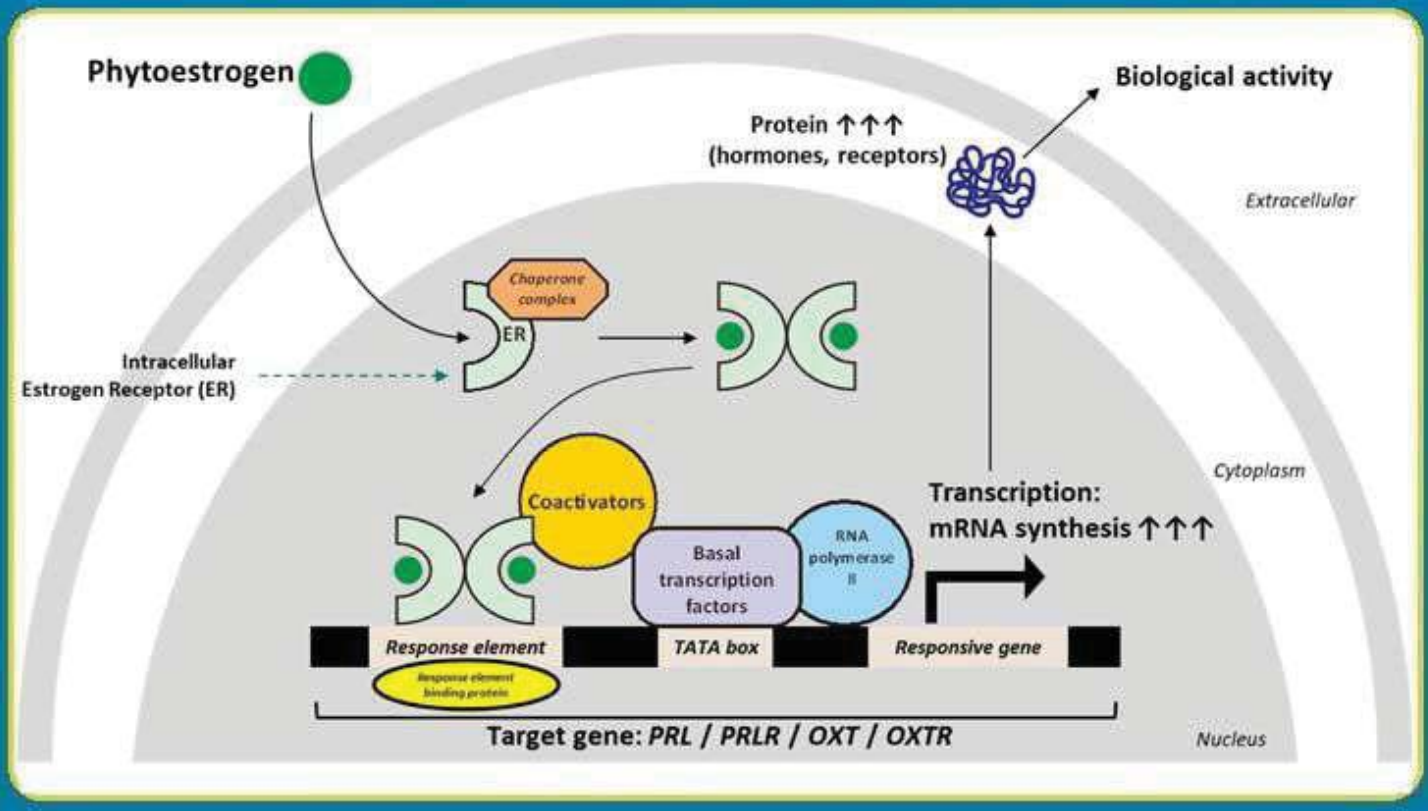
How to cite this article:
Presley B, Halim SV, Setiawan E. Cost-effectiveness analysis of several dosage regimens of vancomycin in ventilator-associated pneumonia critically ill patients. J Appl Pharm Sci. 2024;14(11):062–070.

JAPS Journal of Applied Pharmaceutical Science

Volume 14, Issue 11

e-ISSN: 2231-3354



On the Cover: The classic mechanism of phyto-estrogenic compounds and ER-mediated transcription regulatory (Image Credit: Wandansari *et al.* Faculty of Pharmacy, Sanata Dharma University, Indonesia).

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Interests: Pharmaceutics, nanopharmaceuticals, controlled-release formulations, microparticles for drug delivery, ocular delivery, bioavailability enhancement, pharmaceutical analysis.

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Professor and Head Department of Pharmaceutics and Regulatory Affairs Sri Adichunchanagiri College of Pharmacy Adichunchanagiri University B.G.Nagar, Nagamangala (T) Mandya (D). Karnataka, India.
Interests: Novel drug delivery systems, pharmaceutics, biopharmaceutics.

Dr. Teerapol Srichana [View Profile]
Faculty of Pharmaceutical Sciences, Prince of Songkla University, Hat Yai, Songkla, Thailand.

Dr. Oluwafemi Omoniyi Oguntibeju [View Profile]
Department of Biomedical Sciences, Faculty of Health & Wellness Sciences, Cape Peninsula University of Technology, Bellville, South Africa.

Dr. U.S.Mahadeva Rao
Faculty of Medicine, Universiti Sultan Zainal Abidin, Malaysia. [View Profile]
Interests: Biochemistry, cancer, antioxidants, antidiabetic therapy.

Dr. Bhupendra G. Prajapati [ORCID] [Google Scholar]
Department of Pharmaceutics and Pharmaceutical Technology, Shree S.K.Patel College of Pharmaceutical Education & Research,
Faculty of Pharmacy, Ganpat University, Mahesana Gozaria Highway, Mahesana, India.
Interests: Pharmaceutics, Novel Drug Delivery, Lipid-based drug delivery, Modified Drug Delivery, Solid Lipid Nanoparticles, Bioavailability Enhancement.

Dr. Oluwafemi Adeleke Ojo [ORCID] [Google Scholar]
Phytomedicine, Molecular Toxicology, and Computational Biochemistry Research Laboratory (PMTCB-RL),
SDG03 (Good Health and Well-being Research Cluster) Department of Biochemistry, Bowen University,

Iwo, 232101, Osun State, Nigeria.

Interests: Phytomedicine, Molecular Toxicology, Computational Biochemistry, Pharmacological screening of Medicinal plants.

Dr. Manne Munikumar [ORCID] [Google Scholar]
Data Manager, UKRI-GCRF Action Against Stunting Hub, ICMR-National Institute of Nutrition, Jamai-Osmania (Post), Hyderabad-500007, Telangana, India.

Interests: Bioinformatics, Molecular dynamics, Computer-aided drug design, Systematic reviews, Meta-analysis.

Dr. Mosaad Attia Abdel-Wahhab [ORCID]
Food Toxicology & Contaminants Department, National Research Centre, Dokki, Cairo, Egypt.

Interests: Toxicology, Biochemistry, Pharmaceutical Biotechnology, Pharmaceutical Microbiology, Pharmacological screening of Medicinal plants.

Dr. Yadu Nandan Dey [ORCID] [Google Scholar] [Vidwan Profile]
Department of Pharmacology, Dr. B.C. Roy College of Pharmacy and Allied Health Sciences, Durgapur-713206, West Bengal, India.

Interests: Pharmacology, Safety and efficacy of herbal medicine, Inflammatory diseases, Diabetes, Urolithiasis, and arthritis.

Dr. Ramith Ramu [ORCID] [Google Scholar]
Department of Biotechnology & Bioinformatics, JSS Academy of Higher Education & Research (Deemed to be University),
Sri Shivarathreeshwara Nagara, Mysuru, Karnataka 570015, India.

Interests: Alpha Glucosidase inhibitors, Diabetes management, Computer-aided drug designing, In Silico studies, network pharmacology, Functional foods, and nutraceuticals.

Dr. Howard Diego Ramirez Malule [ORCID] [Google Scholar]
Full Professor for Chemical Engineering, School of Chemical Engineering, Universidad del Valle, Colombia.

Interests: Biotechnology, Pharmaceutical Sciences, Bibliometric analysis.

Dr. Monica BUTNARIU [ORCID] [Google Scholar]
Professor, Chemistry & Biochemistry Discipline, University of Life Sciences "King Mihai I", from Timisoara, 300645, Calea Aradului 119, Timis, Romania.

Interests: Nutritional Biochemistry, Pharmacology and toxicology, Medical Biochemistry, Natural Products.

Dr. Azizi B Hj. Miskon [ORCID] [Google Scholar]
Professor and Deputy Vice-Chancellor (Research and Innovation), National Defense University of Malaysia (NDUM), Kem Perdana Sungai Besi, 57 000 Kuala Lumpur Malaysia.

Interests: Stem Cell Differentiation, The Effect of Magnetic Field on cells behavior, Tissue Engineering, and Regenerative Medicine.

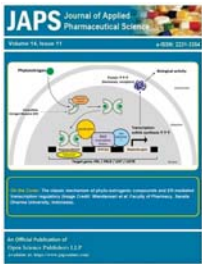
Prof. Antonio Vassallo [ORCID] [Website]
Associate Professor, Department of Science, University of Basilicata, Via dell'Ateneo Lucano, Potenza, Italy.

Interests: Pharmaceutical Sciences, drug delivery systems, cosmetic products, nanomaterials and nanotechnologies, natural products, analytical chemistry.

Dr. Pukar Khanal [View Profile] [Google Scholar]
Pharmacology and chemical biology O. Wayne Rollins Research Center Emory University, Atlanta, GA.

Interests: Glucose homeostasis, Tumor biology, Neuropharmacology, Pharmacology.

Dr. Sai Prachetan Balguri



November, 2024

Volume: 14, Issue: 11

In this Issue: Research Article: 21, Review Article: 4

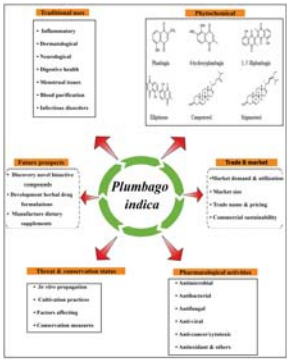
On the cover: The classic mechanism of phyto-estrogenic compounds and ER-mediated transcription regulatory (Image Credit: Wandansari et al. Faculty of Pharmacy, Sanata Dharma University, Indonesia).

20 Oct, 2024 Review Article

Comprehensive review on *Plumbago indica*: Traditional, pharmacological insights and conservation strategies

Abdulkadir Abdu, Akhilesh Prakash, Rishav Kondal, Sudhir Sharma, Mani Bhagat, Ritu Pal, Hasandeep Singh, Balbir Singh, Sarabjit Kaur

DOI: 10.7324/JAPS.2024.200049 Pages: 001-016



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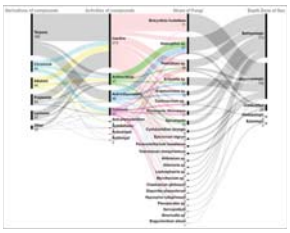
20 Oct, 2024 Review Article

Diversity of chemistry, activities, and depths zone of new compounds isolated from marine-sediment fungi

Safwan Safwan, Siti Rahmatul Aini, Sucilawaty Ridwan, Anna Pradiningsih, Eskarani Tri Pratiwi, Abdul Rahman Wahid

DOI: 10.7324/JAPS.2024.203626 Pages: 017-028



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20 Oct, 2024 Review Article

Biological activities of *Chrysanthemum morifolium* and *Chrysanthemum indicum*: molecular prospective

Nur Vaizura Mohamad, Che Nur Mazadillina Che Zahari

DOI: 10.7324/JAPS.2024.171645 Pages: 029-041

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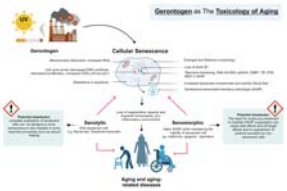
20 Oct, 2024 Review Article

The interconnections between gerontogen, aging, and senotherapy

Rahma Rahma, Agian Je lano Barinda

DOI: 10.7324/JAPS.2024.184140 Pages: 042-052



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20 Oct, 2024 Research Article

Enhanced bioavailability through quality by design optimization of ceritinib nanostructured lipid carriers: Formulation, characterization, and stability evaluation

Kunchithapatham Janakiraman, Katla Venu Madhav, Sunil Kumar Chaitanya Padavala, Naga Haritha Pamujula

DOI: 10.7324/JAPS.2024.188653 Pages: 053-061

Abstract Full Text PDF

20 Oct, 2024 Research Article

Cost-effectiveness analysis of several dosage regimens of vancomycin in ventilator-associated pneumonia critically ill patients

Bobby Presley, Steven Victoria Halim, Eko Setiawan

DOI: 10.7324/JAPS.2024.194102 Pages: 062-070

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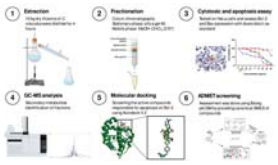
20 Oct, 2024 Research Article

Diterpene alcohol fraction of *Cyperus rotundus* Linn essential oil regulates Bcl-2 and Bax expression inducing apoptosis on HeLa *in*

vitro and *in silico*

Susianti Susianti, Yanwirasti Yanwirasti, Eryati Darwin, Jamsari Jamsari, Arif Setiawansyah

DOI: 10.7324/JAPS.2024.188231 Pages: 071-081



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Fermented calabash fruit-derived choline (*Crescentia cujete* L.) against artificial-induced ischemic stroke in rat models: Analysis of N/LR, PWR, histopathology, GM-CSF, and VEGF

Yos Adi Prakoso, Jasir Hakim Hidayah, Sitarina Widyarini

DOI: 10.7324/JAPS.2024.188046 Pages: 082-092

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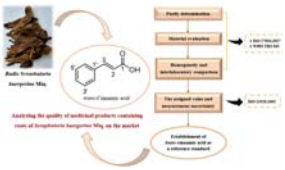
20 Oct, 2024 Research Article

Isolation and establishment of *trans*-cinnamic acid as a reference standard from Radix *Scrophularia buergeriana* Miq

Ngan Nguyen Kim Luu, Ngan My Tran, Phuong Thu Tran, Duong Hoang Trinh

DOI: 10.7324/JAPS.2024.186113 Pages: 093-099



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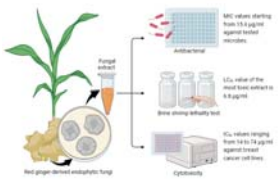
20 Oct, 2024 Research Article

Endophytic fungi from red ginger (*Zingiber officinale var. rubrum*) as promising source of antimicrobial and cytotoxic secondary metabolites

Ni Putu Ariantari, Ni Putu Eka Leliqia, I Putu Yogi Astara Putra, Nadzifa Nugraheni, Riris Istighfari Jenie, Edy Meiyanto

DOI: 10.7324/JAPS.2024.178823 Pages: 100-110



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20 Oct, 2024 Research Article

Anti-oxidative constituents of *Musa balbisiana* Colla fruit extract and evaluation of hepatoprotective activity in CCl_4-induced hepatotoxicity

in Swiss albino mice

Nabanita Baruah, Madhubanti Das, Kandarpa Kumar Saikia, Jogen Chandra Kalita

DOI: 10.7324/JAPS.2024.172339 Pages: 111-119

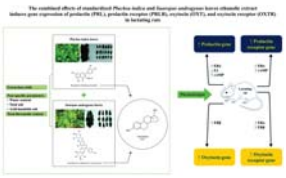
Abstract Full Text PDF

20 Oct, 2024 Research Article

Standardized mixture of *Pluchea indica* and *Sauropus androgynus* extract stimulates the gene expression associated with lactogenesis in rats

Eustachia Diajeng Wandansari, Rul Affyah Syarif, Dian Eurike Septyaningtrias, Setyo Purwono, Eti Nurwening Sholikhah

DOI: 10.7324/JAPS.2024.164075 Pages: 120-130



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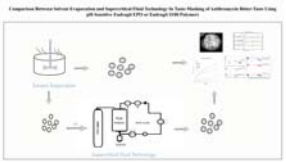
20 Oct, 2024 Research Article

Comparison between solvent evaporation and supercritical CO_2 technology in taste-masking of Azithromycin bitter-taste using pH-sensitive Eudragit EPO or Eudragit S100 polymers

Hadeia Mashaqbeh, Rana Obaidat, Mo'tasem M. Alsmadi, Tamara Athamneh

DOI: 10.7324/JAPS.2024.171403 Pages: 131-138



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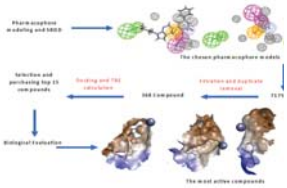
20 Oct, 2024 Research Article

Integrating ligand and structure-based discovery approaches to unravel potential novel glyoxalase-I inhibitors

Roa'a Bani-Khalaf, Qosay Al-Balas, Soraya Alnabulsi

DOI: 10.7324/JAPS.2024.193801 Pages: 139-152



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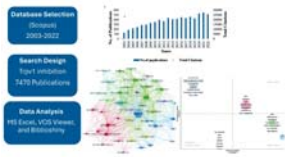
20 Oct, 2024 Research Article

Research Trend in The Inhibition of Transient Receptor Potential Vanilloid 1 (TRPV1): Bibliometric Analysis and Visualization

Shereen M. Aleidi, Amani A. Harb, Lina A. Dahabiyeh, Montaha AL-lede, Islam Hamad, Walhan Alshaer, Ihab M. Almasri, Yasser Bustanji

DOI: 10.7324/JAPS.2024.188749 Pages: 153-166



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20 Oct, 2024 Research Article

Computational investigation into *Parinari curatellifolia* flavonoids as lead hepatoprotective therapeutics

Ayodeji Amobonye, Saheed Sabiu, Mary Tolulope Olaleye, Santhosh Pillai

DOI: 10.7324/JAPS.2024.188178 Pages: 167-177

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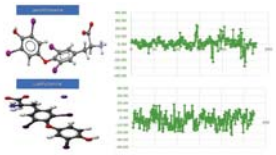
20 Oct, 2024 Research Article

Simultaneous determination of levothyroxine and its metabolite liothyronine in human serum by using LC-ESI-MS/MS and its bioequivalence application

Kanchan Soni, Gopal Prasad Agrawal

DOI: 10.7324/JAPS.2024.187582 Pages: 178-188



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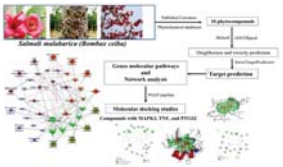
20 Oct, 2024 Research Article

Computational analysis of *Salmalia malabarica* (*Bombax ceiba*) for the management of ulcerative colitis

Savita Bhosale, Prashant G. Jadar, Sunil S. Jalalpure, Vishal S. Patil, Kashinath Hiremath

DOI: 10.7324/JAPS.2024.161733 Pages: 189-195



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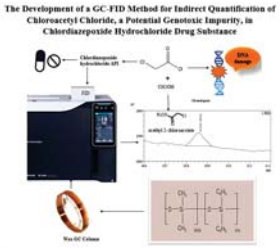
20 Oct, 2024 Research Article

The development of a GC-FID method for indirect quantification of chloroacetyl chloride, a potential genotoxic impurity, in chlordiazepoxide hydrochloride drug substance

Srinivas Birudukota, Bhaskar Mangalapu, Ramesha Andagar Ramakrishna, Swagata Halder, Venkata

Narayana Palakollu

DOI: 10.7324/JAPS.2024.182017 Pages: 196-207



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20 Oct, 2024 Research Article

Anticancer activity of liposomal formulation co-encapsulated with coumarin and phenyl butyric acid

Ali Allateef, Naeem Shalan, Zainab Laffi

DOI: 10.7324/JAPS.2024.181335 Pages: 208-215

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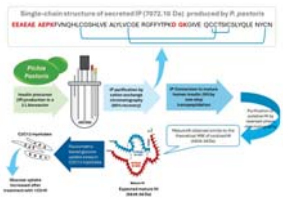
20 Oct, 2024 Research Article

Characterization of functional human insulin produced using the *Pichia pastoris* expression system

Dini Nurdiani, Eko Wahyu Putro, Endah Puji Septisetyani, Nuruliawaty Utami, Hariyatun Hariyatun, Pekik Wiji Prasetyaningrum, Wien Kusharyoto

DOI: 10.7324/JAPS.2024.180473 Pages: 216-226



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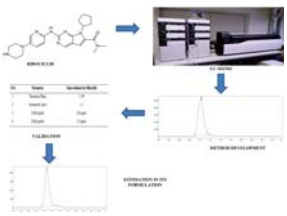
20 Oct, 2024 Research Article

A sensitive liquid chromatography tandem mass spectrometric method development and validation for ribociclib and its formulation

J. Ramesh, B. Babu, R. Sangamithra, D. Anandha Jothi, S.N. Meyyanathan, B. Gowramma

DOI: 10.7324/JAPS.2024.178562 Pages: 227-232



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A design of expert-based development and optimization of voriconazole-loaded aspasomal gel for topical delivery

Shubham Bajirao Patil, Panchakshari Dandagi, Sujay Hulyalkar, Rubeen Dadakalandar Nadaf

DOI: 10.7324/JAPS.2024.173833 Pages: 233-242

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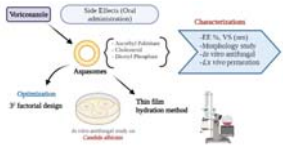

20 Oct, 2024 Research Article

Inhibitory effect of ink derived from Indian *Loligo duvauceli* squid against HIF1α induced angiogenesis

Seyedeh Sara Kamyab, Alpana S. Moghe, Shyam S. Nandi, Sonali A. Sawant

DOI: 10.7324/JAPS.2024.173159 Pages: 243-251

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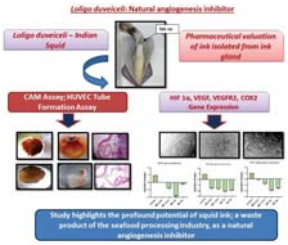

20 Oct, 2024 Research Article

Prevalence and risk factors of cosmetic-induced adverse events: A systematic review and meta-analysis

Sweta Kumari, Tambe Daniel Atem, Vaibhav Chaudhary, Sanjeev Kumar Sahu, Biplab Pal

DOI: 10.7324/JAPS.2024.193512 Pages: 252-263

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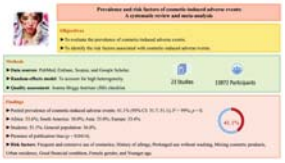

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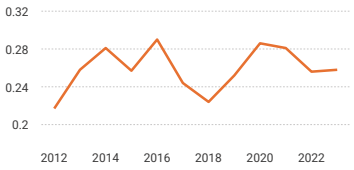

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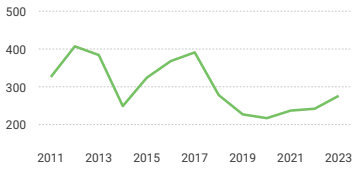

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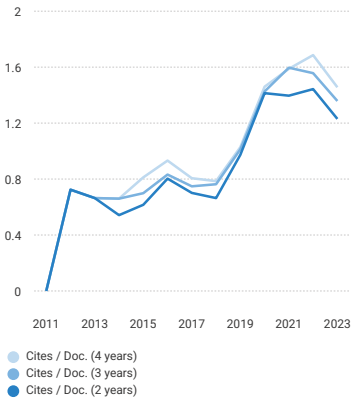

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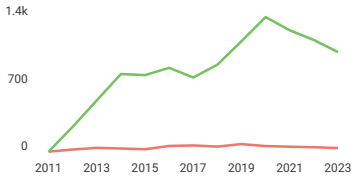

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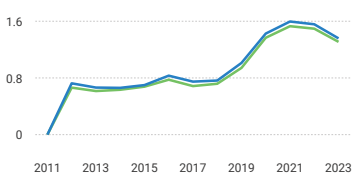

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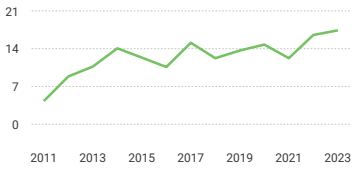

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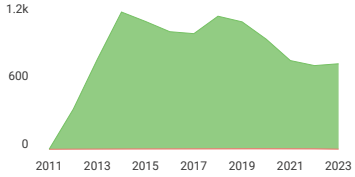

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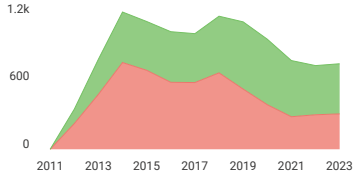
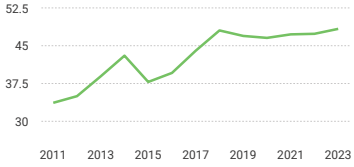


% Female Authors



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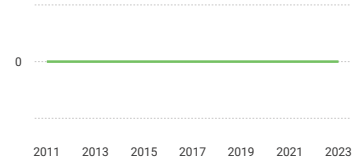
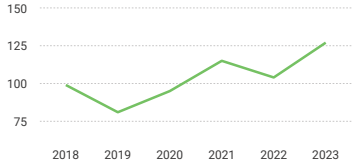


Documents related to SDGs (UN)



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S **SEDEGAN BIENVENUE** 2 years ago

Salut a votre auguste assemblée
Tres interessé par une publication dans votre journal. Veuillez bien nous faire savoir kes recommandations aux auteurs

Merci

Close

A **Abebech** 4 months ago

how are you i want to publish paper can you tell about the journal quartile thank you

SCImago Team

Melanie Ortiz 2 years ago

Dear Sedegan,
Thank you for contacting us.
We are sorry to tell you that SCImago Journal & Country Rank is not a journal. SJR is a portal with scientometric indicators of journals indexed in Elsevier/Scopus.
We suggest you visit the journal's homepage (See submission/author guidelines) or contact the journal's editorial staff , so they could inform you more deeply.
Best Regards, SCImago Team

C **Christopher Busayo Olowosoke** 2 years ago

Is this journal still Scopus indexed? what is the impact factor

reply

SCImago Team

Melanie Ortiz 2 years ago

Dear Christopher, thank you very much for your comment. We suggest you consult the Scopus database directly. Keep in mind that the SJR is a static image (the update is made one time per year) of a database (Scopus) which is changing every day.
The Scopus' update list can also be consulted here:
https://www.elsevier.com/solutions/scopus/how-scopus-works/content
We also suggest you consult the Journal Citation Report for other indicators (like Impact Factor) with a Web of Science data source.
Best Regards, SCImago Team

A **Anusha** 2 years ago

Let me know why the journal is not visible in scopus site, it is indexed under Scopus or it is removed

reply

P **Paras Sharma** 2 years ago

You can find it here: https://www.scopus.com/sourceid/21100236605

SCImago Team

Melanie Ortiz 2 years ago

Dear Anusha,
Thank you very much for your comment.
All the metadata have been provided by Scopus /Elsevier in their last update sent to SCImago, including the Coverage's period data. The SJR for 2021 was released on 11 May 2022. We suggest you consult the Scopus database directly to see the current index status as SJR is a static image of Scopus, which is changing every day.
The Scopus' update list can also be consulted here:
https://www.elsevier.com/solutions/scopus/how-scopus-works/content
Best Regards, SCImago Team

A **Ankita** 3 years ago

I would like to know if the Journal of Applied Pharmaceutical science is a SCI indexed journal and whether its impact factor is the same as SJR.

I look forward to hearing from you.

reply

SCImago Team

‹

uses Scopus data, our impact indicator is the SJR. We suggest you consult the Journal Citation Report for other indicators (like Impact Factor) with a Web of Science data source.
Keep in mind that the Source and the Methodology used by SJR are different from the JCR.
Best Regards, SCImago Team

N **Nandini** 3 years ago

What is the impact factor of this journal

reply

SCImago Team

Melanie Ortiz 3 years ago

Dear Nandini, thank you very much for your comment. SCImago Journal and Country Rank uses Scopus data, our impact indicator is the SJR (Check it on our website). We suggest you consult the Journal Citation Report for other indicators (like Impact Factor) with a Web of Science data source.
Best Regards, SCImago Team

P **Pankaj Kharabe** 4 years ago

Journal of applied pharmaceutical science is as per my concern is one of the best journal.

The way they review the articles is excellent, as well as their selection criteria for acceptance, is also quite remarkable.

Including these, if this journal specify the need of LC-MS and GC-MS NMR FTIR, SFC techniques along with HPLC, during the selection of analysis-based articles then it will improve its impactiveness.

Above all, I would like to say that this journal has a bright future just it needs the proper selection of reviewers and articles.

reply

SCImago Team

Melanie Ortiz 4 years ago

Dear Pankaj, thanks for your participation! Best Regards, SCImago Team

S **Swathi Swaroopa B** 4 years ago

Is this journal still indexed in Scopus for 2021

reply

SCImago Team

Melanie Ortiz 4 years ago

Dear Swathi, thank you very much for your comment. We suggest you consult the Scopus database directly. Keep in mind that the SJR is a static image (the update is made one time per year) of a database (Scopus) which is changing every day.
Best Regards, SCImago Team

M **marwa** 5 years ago

Where is the journal's home page and why it is not listed here with the information?

reply

SCImago Team

Melanie Ortiz 5 years ago

Dear Marwa,

Thank you for contacting us.

We inform you that all the information referring to the website of this Jou

Best Regards,
SCImago TEAM

D **Dr. Sanjeev Kumar** 5 years ago

Do you accept articles based on clinical trials?

reply

SCImago Team

Melanie Ortiz 5 years ago

Dear Dr. Sanjeev,
thank you for contacting us.
We are sorry to tell you that SCImago Journal & Country Rank is not a journal. SJR is a portal with scientometric indicators of journals indexed in Elsevier/Scopus.
Unfortunately, we cannot help you with your request, we suggest you visit the journal's homepage (See scope) or contact the journal's editorial staff , so they could inform you more deeply.
Best Regards, SCImago Team

U **Unknown** 5 years ago

it is not a reliable journal.Dont waste your time.

reply

P **Prof. V M Garg** 5 years ago

I have been a reviewer and author of this journal for the last 3 years. I have found it Good. Their review procedure is transparent and thorough. They have provided clear ethical instructions.

J **Jassi** 5 years ago

Is the international journal of advanced research an authenticate journal to publish our work? The 2018 impact factor is shown as 7 but I can barely find it's article on pubmed or any other database. Please help me with this so that I can publish my work only in an original journal that is authenticate too.

reply

SCImago Team

Melanie Ortiz 5 years ago

Dear Jassi,
Could you please expand a little bit your comment? This journal is called Journal of Applied Pharmaceutical Science. Best Regards, SCImago Team

D **D.shakeer hussain** 5 years ago

Respected sir , How much does it costs for the publication review article .

reply

D **Dr. Asif M** 4 years ago

The Article Processing Charge (APC) is approximately rupees 7000 for this journal as it is an Open Access journal

SCImago Team

Melanie Ortiz 5 years ago

Dear Shakeer,
thank you for contacting us.
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D **Dr. G. Adaikala Raj** 5 years ago

Respected sir,

As i am reviewer in your journals. I am submit the one articles paper if you any discount/ free publication in my paper. Please take necessary action.

Thanking you sir

reply

SCImago Team

Melanie Ortiz 5 years ago

Dear user,
thank you for contacting us.
Sorry to tell you that SCImago Journal & Country Rank is not a journal. SJR is a portal with scientometric indicators of journals indexed in Elsevier/Scopus.
Unfortunately, we cannot help you with your request, we suggest you to visit the journal's homepage or contact the journal's editorial staff , so they could inform you more deeply.
You can see the updated journal's information just above .
Best Regards, SCImago Team

RAHUL KAUSHIK 7 years ago

Journal of Applied Pharmaceutical Sciences is a world class journal. It has a stringent manuscript selection process which allows only quality publications.

reply

S **soha** 2 years ago

why is it listed as predatory journal in beallist?

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Source details

Journal of Applied Pharmaceutical Science

Years currently covered by Scopus: from 2011 to 2025

Publisher: Open Science Publishers LLP Inc.

E-ISSN: 2231-3354

Subject area: Pharmacology, Toxicology and Pharmaceutics: General Pharmacology, Toxicology and Pharmaceutics | Medicine: Medicine (miscellaneous) | Medicine: Pharmacology (medical)

Source type: Journal

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0.437

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Calculated on 05 May, 2024

CiteScoreTracker 2024

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CiteScore rank 2023

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