Introduction

Diabetes mellitus (DM) is a chronic metabolic disease that has now been recognized as one of the most challenging health problems. Main symptom of DM is hyperglycemia (high blood glucose levels) which often time leads to severe diabetic complications over time, including coronary artery disease, stroke, peripheral artery disease, retinopathy, nephropathy, and neuropathy. To treat patients with DM is essential to control the level of blood glucose and consequently deferring glucose-related complications caused by DM. α-Glucosidase inhibitors are a class of drugs with the ability to treat DM patients by preventing the carbohydrates digestion and consequently deferring glucose absorption as well as suppressing the postprandial hyperglycemia. Therefore, the inhibitors of α-glucosidase are usually suggested as vital agents to treat patients with DM. They can be used alone or in combination with other antidiabetic agents for the treatment of type 2 diabetes mellitus (T2DM) and can also be used for patients with type 1 diabetes mellitus (T1DM).

Alpha-Glucosidase (α-Glucosidase) inhibitors, which are classified as third generation oral hypoglycemic agents have shown vital inhibition of postprandial blood glucose in T2DM patients, and have been recommended as a first line therapy by the International Diabetes Federation and the American Association of Clinical Endocrinologists. Hence, α-glucosidase is considered a safe natural inhibitor with little or no side effects which historically attracts broad interests for use as a main ingredient in the management of T2DM around the world.

Materials and Methods

General experiment procedure

1D and 2D NMR experiments were performed on a Bruker 600 MHz (1H) and 151 MHz (13C) spectrometer in solvent DCl. The chemical shifts were reported in ppm with referenced to tetramethyl silane as internal standard. Vacuum liquid chromatography and analytical preparative thin layer chromatography were performed on Kieselgel 60 (254, Merck). Merck Kieselgel 60 (40-63 µm) was employed for column chromatography. Spectrophotometric measurements for the α-glucosidase inhibition were recorded on a Tecan Infinite 50 microplate reader spectrophotometer.

Plant material

The roots of C. excavata were collected in Naypyitaw region, Myanmar in July 2016. The plant was identified by the Botany Department, Mandalay University, Myanmar with the specimen voucher number UM-22032018.

Citation:

Extraction and isolation

The roots were air dried and then were cut into small pieces. The powder material (3.6 kg) was extracted with 95% ethanol (120 L) to yield a crude extract. After removing the solvent, 100 g of the extract was dissolved in methanol (300 mL) then it was extracted thrice using n-hexane in ratio 1:1(v/v). The methanol fraction (80.4 g) was subjected to Vacuum Liquid Chromatography (VLC) over silica gel eluting step-wise with mixture of n-hexane and ethyl acetate (EtOAc) to yield seven combined fractions (CF-1 to CF-7). Fraction CF-6 (25.6 g) was further fractionated by VLC with a gradient of n-hexane and ethyl acetate (n-hexane, 90:10-10:90, ethyl acetate) to obtain sub-fractons AF-1 to AF-7. AF-2 (80.60 mg) was further purified by silica gel column chromatography using three solvent systems of n-hexane-chloroform-ethyl acetate with the ratio of 100:70, 5:10:5, 5:20:1, total of 67 fractions were collected and fractions 41-58 yielded a white amorphous solid and they were combined and purified in ethyl acetate to produce 4.5 mg of compound 1. AF-1 was subjected to column chromatography using n-hexane-ethyl acetate (n-hexane, 90:1:10:100, EtOAc) to obtain compounds 2 (9.8 mg) and 3 (28.6 mg) as pale yellow solids.

α-Glucosidase inhibitory activity

The α-glucosidase inhibitory activity was investigated using a protocol previously described by 9. The inhibition against rat intestinal maltase and sucrase by the isolated compounds and fractions were determined using the aforementioned protocol. A 10 μL of phosphate buffer (pH 6.9, 30 μL), 20 μL of the substrate solution (maltose: 10 mM; sucrose: 100 mM) in 0.1 M phosphate buffer, glucose kit (80 μL) and the acetone extract of rat intestinal crude enzyme solution (20 μL) were mixed. The reaction mixture was then incubated at 37°C for either 10 min (for maltose) or 40 min (for sucrose). The concentration of glucose released from the reaction mixture was detected by the glucose oxidase method using a glu-kit (Human, Germany). Enzymatic activity was quantified by measuring absorbance at 503 nm. The percent inhibition of reaction was calculated using the formulae:

\[
\frac{(A_0 - A_i)}{A_0} \times 100
\]

where \(A_0\) is the absorbance without the sample, and \(A_i\) is the absorbance with the sample. The IC\(\text{50}\) value was determined from a plot of percentage inhibition versus sample concentration. Acarbose was used as standard control and the experiment was performed in triplicate.

In addition, the inhibition against yeast by all isolated compounds was determined by the method described by 10. Sample (10 μL) with the concentrations (5.0, 1.0, 0.20 and 0.04 mg/mL) was mixed with yeast (0.4 U/mL) in 1 mM phosphate buffer (pH 6.9), followed by shaking with microplate shaker about 2 min and pre-incubation at 37°C for 10 min. To the reaction mixture was added 50 μL of n-nitrophenyl-β-D-glucopyranoside (PNPG) and then the mixture was incubated at 37°C for 20 min. After the incubation period, the reaction was quenched by adding Na\(_2\)CO\(_3\) (1M, 100 μL). The release of p-nitrophenoxide from PNPG was detected by a microplate reader at 415 nm (iMark microplate reader).

Statistical analysis

All data are given as duplicate measurements and analyzed by non-linear regression analysis. Quantitative data obtained were analyzed descriptively. All measurement was done in duplicate.

Results and Discussion

Compound 1 was obtained as a white amorphous powder. The proton NMR spectrum showed the presence of two cis-olefinic signals at δ\(H\) 6.17 (1 H, J = 9.3 Hz, H-3) and 7.84 (1 H, J = 9.3 Hz, H-4). The presence of three aromatic protons was indicated by an ABX system at δ\(H\) 7.44 (d, J = 8.5 Hz, H-5), 6.78 (1H, dd, J =2.2, 8.5 Hz, -H6) and δ\(H\) 6.70 (d, J =2.2 Hz, H-8) (Table 1). The \(^1\)C-NMR spectrum of compound 1 showed a cyclic lactone carbonyl at δ\(C\) 162.4, three quarternary carbons 111.6, 162.2, 155.9, three aromatic CH carbons at 110.7, 129.2, 113.3, and two olefinic CH carbons at 144.7, 102.1 (Table 1). The DQF-COSY spectrum showed neighboring proton connections between δ\(H\) 6.16 (H-3) and δ\(H\) 7.84 (H-4), and also δ\(H\) 6.78 (H-6) with 7.44 (H-5), and 6.70 (H-8). The long range HMBC experiments of compound 1 also confirmed the positions of protons and carbons in the compounds. From the above data, the structure of compound 1 was identified as umbelliferone (Figure 1) and the chemical shift data were in agreement with literature reports. 11 Compound 2 was obtained as a yellowish solid. The \(^1\)H-NMR data of compound 2 revealed protons characteristic of a coumarin moiety by two doublet signals at δ\(H\) 6.16 and 8.04 (each 1H, J = 9.6 Hz). Moreover, the presence of prenyl moiety was indicated by signals at δ\(H\) 6.23 (dd, J = 17.4, 10.5 Hz, 1H), 5.08 (dd, J = 17.4, 0.9 Hz, 1H), 5.06 (dd, J = 10.5, 0.9 Hz, 1H), and two germinal methyl group at 1.64 (s, 6H). The existence of a benzopyran ring was shown by a singlet signal representing two methylene protons at δ\(H\) 2.75 (s, 2H) and another set of germinal methyl groups at δ\(H\) 1.49 (s, 6H) (Table 1). The \(^1\)C-NMR and DEPT-90 and 135 spectra also indicated the presence of a cyclic lactone and ketone carbonyls at δ\(C\) 160.6 and 198.2, respectively (Table 1). All the NMR data support compound 2 being clausenidin (Figure 1) and its NMR data also matched with literatures reports. 11-14 Compounds 3 was also obtained as a pale yellow solid. The \(^1\)H-NMR spectrum of the compound suggested a carbazole alkaloid type moiety based on the aldehyde proton signal at δ\(H\) 9.93, N-H at 8.21, a hydrogen bonded OH at 11.42. Two singlets signals at δ\(H\) 6.84 (s, 1H), and 8.05 (s, 1H) indicated a disubstitution on ring B. An ABX system of signals at 7.85 (d, J = 8.3 Hz, 1H), 6.89 (ms, 1H) and 6.88 (d, J = 2.2 Hz, 1H) revealed that position C-7 of ring A was substituted. The \(^1\)H-NMR also showed the presence of one methoxy group at δ\(H\) 3.93 (s, 3H). The existence of aldehydic carbonyl at δ\(C\) 195.1 was confirmed by \(^13\)C-NMR, together with DEPT-90 and 135. After careful analysis of the 2D NMR and comparison with previous report the compound 3 was identified as 2-hydroxy-3-formyl-7-methoxy carbazole (lasine) (Figure 1). 11

The α-glucosidase inhibitory effect of the methanol fraction, n-hexane fraction, and the two of the isolated compounds (2 and 3) were tested using rat intestinal (maltase, sucrase) baker yeast enzymes. The methanol fraction with IC\(\text{50}\) of 0.020 mg/mL showed a higher inhibitory activity than the n-hexane fraction with IC\(\text{50}\) of 0.041 μg/mL against maltase enzymes. But the two fractions (methanol and n-hexane) showed moderated activity against sucrase with IC\(\text{50}\) values of 0.063 mg/mL each. Clausenidin (2) and lasine (3) showed no inhibition against yeast enzymes (Table 3).

[Figure 1: Chemical structures of isolated compounds from C. excavate]
Table 1: The $^1$H (600 MHz), $^{13}$C (151 MHz) NMR spectral data of compounds 1 and 2 in CDCl$_3$

<table>
<thead>
<tr>
<th>Position</th>
<th>$\delta_H$ (multi, $J$ values in Hz)</th>
<th>$\delta_C$ (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>-</td>
<td>162.4</td>
</tr>
<tr>
<td>3</td>
<td>6.17 ($d$, $J = 9.3$ Hz, 1H)</td>
<td>110.7</td>
</tr>
<tr>
<td>4</td>
<td>7.84 ($d$, $J = 9.3$ Hz, 1H)</td>
<td>144.7</td>
</tr>
<tr>
<td>4a</td>
<td>-</td>
<td>111.6</td>
</tr>
<tr>
<td>5</td>
<td>7.44 ($d$, $J = 8.5$ Hz, 1H)</td>
<td>129.2</td>
</tr>
<tr>
<td>5a</td>
<td>-</td>
<td>104.0</td>
</tr>
<tr>
<td>6</td>
<td>6.78 ($dd$, $J = 2.3, 9.6$ Hz, 1H)</td>
<td>113.3</td>
</tr>
<tr>
<td>7</td>
<td>-</td>
<td>102.1</td>
</tr>
<tr>
<td>8</td>
<td>6.70 ($d$, $J = 2.2$ Hz, 1H)</td>
<td>155.9</td>
</tr>
<tr>
<td>9a</td>
<td>-</td>
<td>27.2</td>
</tr>
<tr>
<td>10</td>
<td>-</td>
<td>27.2</td>
</tr>
<tr>
<td>10a</td>
<td>-</td>
<td>159.9</td>
</tr>
<tr>
<td>1'</td>
<td>-</td>
<td>114.5</td>
</tr>
<tr>
<td>2'</td>
<td>6.23 ($dd$, $J = 17.4, 10.5$ Hz, 1H)</td>
<td>149.6</td>
</tr>
<tr>
<td>3'</td>
<td>-</td>
<td>108.4</td>
</tr>
<tr>
<td>3'a</td>
<td>5.08 ($dd$, $J = 17.4, 0.9$ Hz, 1H)</td>
<td></td>
</tr>
<tr>
<td>3'b</td>
<td>5.06 ($dd$, $J = 0.9, 10.5$ Hz, 1H)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: The $^1$H (600 MHz), $^{13}$C (151 MHz) NMR spectral data of compound 3 in CDCl$_3$

<table>
<thead>
<tr>
<th>Position</th>
<th>$\delta_H$ (multi, $J$ Hz)</th>
<th>$\delta_C$ (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>-</td>
<td>145.7</td>
</tr>
<tr>
<td>1</td>
<td>6.84 (s, 1H)</td>
<td>96.9</td>
</tr>
<tr>
<td>2</td>
<td>-</td>
<td>160.6</td>
</tr>
<tr>
<td>3</td>
<td>-</td>
<td>126.8</td>
</tr>
<tr>
<td>4</td>
<td>8.05 (s, 1H)</td>
<td>125.9</td>
</tr>
<tr>
<td>4a</td>
<td>-</td>
<td>115.4</td>
</tr>
<tr>
<td>5a</td>
<td>-</td>
<td>117.9</td>
</tr>
<tr>
<td>5</td>
<td>7.85 ($d$, $J = 8.3$ Hz, 1H)</td>
<td>120.5</td>
</tr>
<tr>
<td>6</td>
<td>6.89 (m, 1H)</td>
<td>95.6</td>
</tr>
<tr>
<td>7</td>
<td>-</td>
<td>159.2</td>
</tr>
<tr>
<td>8</td>
<td>6.88 ($d$, $J = 2.2$ Hz, 1H)</td>
<td>108.9</td>
</tr>
<tr>
<td>8a</td>
<td>-</td>
<td>141.5</td>
</tr>
<tr>
<td>7-OCH$_3$</td>
<td>3.93 (s,3H)</td>
<td>55.7</td>
</tr>
<tr>
<td>-CHO</td>
<td>9.93</td>
<td>195.1</td>
</tr>
<tr>
<td>-NH</td>
<td>8.21</td>
<td>-</td>
</tr>
<tr>
<td>-OH</td>
<td>11.42</td>
<td>-</td>
</tr>
</tbody>
</table>
Table 3: α-Glucosidase inhibitory activities of fractions and isolated compounds

<table>
<thead>
<tr>
<th>Fraction/Compound</th>
<th>Baker’s yeast IC₅₀ (mM)</th>
<th>Maltase IC₅₀ (mg/mL)*</th>
<th>Sucrase IC₅₀ (mg/mL)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>n-hexane fraction</td>
<td>-</td>
<td>0.041</td>
<td>0.063</td>
</tr>
<tr>
<td>methanol fraction</td>
<td>-</td>
<td>0.020</td>
<td>0.063</td>
</tr>
<tr>
<td>2</td>
<td>NI</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>NI</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Acarbose</td>
<td>0.1030</td>
<td>2.35 (μM)</td>
<td>15.48 (μM)</td>
</tr>
</tbody>
</table>

* Nonlinear regression analyses were evaluated by Sigma-Plot 12.5
NI = no inhibition at concentration ≤ 5 mg/mL.

Conclusion

Three compounds were obtained from C. excavata. The antidiabetic activity of the compounds and fractions were evaluated. The methanol fraction showed higher inhibitory activity than the n-hexane fraction against maltase enzymes. Among the three isolated compounds, 2 and 3 were tested against the yeast enzymes but both did not show any inhibition.

Conflict of interest

The authors declare no conflict of interest.

Authors’ Declaration

The authors hereby declare that the work presented in this article is original and that any liability for claims relating to the content of this article will be borne by them.

Acknowledgements

This work was supported by: (1) Airlangga Development Scholarship (ADS) (2) The Botany Department, Mandalay University, Myanmar for plant identified, and (3) The Faculty of Pharmacy, Meijo University, Nagoya, Japan for NMR data measurement.

References


Reviews

Original Research Articles

Evaluation of Anti-Diabetic and Anti-Allergic Activities of *Brownlowia tersa* (L.) Kosterm Leaves Extract and Determination of its Phenolic Compounds by HPLC-DAD (viewarticle.aspx?articleid=708)


https://doi.org/10.26538/tjnpr/v4i8.1


**Coumarins and Carbazole Alkaloid from *Clausena excavata* Roots and Investigation of their **α-glucosidase Inhibitory Activity** (viewarticle.aspx?articleid=710)

Tin M. Thant, Nanik S. Aminah, Alfinda N. Kristanti, Rico Ramadhan, Ifla H. Hasna, Hnin T. Aung, Yoshiaki Takaya

https://doi.org/10.26538/tjnpr/v4i8.2


Red Cell Distribution Width and Neutrophil-Lymphocyte Ratio as Markers for Diabetic Nephropathy (viewarticle.aspx?articleid=711)

Ayad M. Gaidan, and Istabraq A. Al-Husseiny

https://doi.org/10.26538/tjnpr/v4i8.3


The prevalence of diarrhoea and drinking water quality in Darbandikhan city, Iraq (viewarticle.aspx?articleid=712)
Sabah S. Mohammed, Yadgar H. Hama-karim, Mohammed I.M. Gubari
https://doi.org/10.26538/tjnpr/v4i8.4 (https://doi.org/10.26538/tjnpr/v4i8.4)


Toxicity Evaluation of Ethanol Extract of *Lansium domesticum* cv kokossan Seeds in Female Wistar Rats (viewarticle.aspx?articleid=713)
Tri Mayanti, Darwati Darwati, Jamaludin Al Anshori, Unang Supratman, Madilah Madilah, Ronny Lesmana, Deden I. Dinata, Shabarni Gaffar
https://doi.org/10.26538/tjnpr/v4i8.5 (https://doi.org/10.26538/tjnpr/v4i8.5)


The Correlation between Belief and Adherence to Therapeutic Regimens in Pharmaceutical Care for Tuberculosis Patients in Primary Healthcare Centres in Surabaya, Indonesia (viewarticle.aspx?articleid=714)
Abdul Rahem, Yuni Priyandani, Mochamad Djunaedi
https://doi.org/10.26538/tjnpr/v4i8.6 (https://doi.org/10.26538/tjnpr/v4i8.6)


Nguyen T. Tung, Duong P. Lan, Ngo T. Hoa, Nguyen T. Duong, Nguyen Q. Hung, Nguyen V. Than
https://doi.org/10.26538/tjnpr/v4i8.7 (https://doi.org/10.26538/tjnpr/v4i8.7)


Bio-Activity Investigations of Extracts of Different Parts of *Lumnitzera littorea* Voigt (viewarticle.aspx?articleid=716)
Luksamee Vittaya, Sukanung Na Ranong, Uiton Charoendat, Sittichoke Janyong, Nararak Leesakul
https://doi.org/10.26538/tjnpr/v4i8.8 (https://doi.org/10.26538/tjnpr/v4i8.8)


*Boswellia carterii* Birdwood Topical Microemulsion for the Treatment of Inflammatory Dermatological Conditions; a Prospective Study (viewarticle.aspx?articleid=717)
Ahmed M. Omar, Nagwa M. Ammar, Rehab A. Hussein, Dina M. Mostafa, Mona Basha, Mahmoud F. Abdel Hamid
https://doi.org/10.26538/tjnpr/v4i8.9 (https://doi.org/10.26538/tjnpr/v4i8.9)


Impact of N-acyl piperidine (Piperine) from *Piper nigrum* on the Pharmacokinetics of CYP3A Substrate Almotriptan in Rats (viewarticle.aspx?articleid=718)
Rajkiran Kolakota, Akhil Bothsa, Vinodkumar Mugada
https://doi.org/10.26538/tjnpr/v4i8.10 (https://doi.org/10.26538/tjnpr/v4i8.10)

Novel Anti-Ulcer Phytosomal Formulation of Ethanol Extract of *Pentaclethra macrophylla* Stem-Bark (viewarticle.aspx?articleid=719)

Petra O. Nnamani, Franklin C. Kenechukwu, Francis O. Asogwa, Mumuni A. Momoh, Claus-Michael Lehr, Anthony A. Attama
https://doi.org/10.26538/tjnpr/v4i8.11 (https://doi.org/10.26538/tjnpr/v4i8.11)


Acute and Sub-Chronic Toxicity Studies on Methanol Stem Bark Extract of *Cussonia barten* Seeman (Araliaceae) in Wistar Rats (viewarticle.aspx?articleid=720)

Galadanchi F. Abdurrahman, Aminu Ambi, Muhammad Bisallah, Abdulhakim Abubakar, Abdulhamid Yusuf, Usman M. Jajere, Idris Z. Yabagi
https://doi.org/10.26538/tjnpr/v4i8.12 (https://doi.org/10.26538/tjnpr/v4i8.12)


Rasheed Y. Oladunjoye, Ahmed A. Odusolu, Raheem A. Asinu, Oyebamiji O. Fafioye
https://doi.org/10.26538/tjnpr/v4i8.13 (https://doi.org/10.26538/tjnpr/v4i8.13)

pages 397 - 400 HTML (viewarticle.aspx?articleid=721) PDF (img/manuscript_721_TJNPR-2020-M037A Galley Proof.pdf)


John O. Ayorinde, and Kolawole T. Jaiyeoba
https://doi.org/10.26538/tjnpr/v4i8.14 (https://doi.org/10.26538/tjnpr/v4i8.14)


Hepatoprotective Effect of Ethanol Leaf Extract of *Ficus thonningii* (Blume) against Carbon Tetrachloride (CCl4)-Induced Hepatotoxicity in Wistar Rats (viewarticle.aspx?articleid=723)

Isyaku Abubakar, Sulaiman S. Kankara, Umar Lawal
https://doi.org/10.26538/tjnpr/v4i8.15 (https://doi.org/10.26538/tjnpr/v4i8.15)


Growth Enhancement of Lactic Acid Bacteria for Production of Bacteriocin Using a Local Condiment Supplemented with Nitrogen Sources (viewarticle.aspx?articleid=724)

Cyprian E. Oshoma, Olatan A. Allen, Priscilla O. Oyedoh
https://doi.org/10.26538/tjnpr/v4i8.16 (https://doi.org/10.26538/tjnpr/v4i8.16)


Acetylcholinesterase Inhibition and Antioxidant Potentials of Some Nigerian Medicinal Plants for the Treatment of Alzheimer Disease and other Related Complications (viewarticle.aspx?articleid=725)
Olatunde A. Oseni, Olayinka S. Okoh, Abolanle A. A. Kayode
https://doi.org/10.26538/tjnpr/v4i8.17 (https://doi.org/10.26538/tjnpr/v4i8.17)


Morphohistological Effect of Prenatal Alcohol Exposure on the Hippocampus of Newborn Wistar Rats (viewarticle.aspx?articleid=726)
Ignatius I. Ozor, Zita N. Agwagu, Elizabeth Firibarri-Bello, Onyinye M. Ozioko, Uche S. Ozioko, Loretta C. Mgbachi
https://doi.org/10.26538/tjnpr/v4i8.18 (https://doi.org/10.26538/tjnpr/v4i8.18)


Modupe O. Ologunagba, Oluwadamilola M. Kolawole*, Asenath N. Echerenwa, Boladale O. Silva
https://doi.org/10.26538/tjnpr/v4i8.19 (https://doi.org/10.26538/tjnpr/v4i8.19)


Anti-Diarrhoeal Properties of the Ethanol Extract of Terminalia glaucescens Roots on Castor Oil-Induced Diarrhoea in Wistar Rats (viewarticle.aspx?articleid=729)
Edith N. Okey, Augustine C. Madueke, Emmanuel C. Ossai*, Assumpta C. Anosike, Lawrence U. S. Ezeanyika
https://doi.org/10.26538/tjnpr/v4i8.20 (https://doi.org/10.26538/tjnpr/v4i8.20)

pages 446 - 450 HTML (viewarticle.aspx?articleid=729) PDF (img/manuscript_729_TJNPR-2020-M072A Galley Proof.pdf)

Ameliorative Effects of Ethyl acetate Fraction of Millettia aboensis Stem Bark on Loperamide-Induced Constipation in Rats (viewarticle.aspx?articleid=730)
Njoku O. Ugochi, Ogugofor M. Obinna, Ogbodo J. Onyebuchi
https://doi.org/10.26538/tjnpr/v4i8.21 (https://doi.org/10.26538/tjnpr/v4i8.21)


Comparative Benefits of Cocos nucifera L. Husk, Milk and Shell Extracts on Body Weight Changes and Haematological Indices in Male Rats (viewarticle.aspx?articleid=731)
Blessing E. Ogeeaweme, Rose A. Arnaechi, Carolyn D. Elpnuke, Blessing O. Ariaogbonbu, Elosa B. Odigie
https://doi.org/10.26538/tjnpr/v4i8.22 (https://doi.org/10.26538/tjnpr/v4i8.22)


Effects of Carica papaya Seeds on Acetaminophen-Induced Hepatotoxicity in Male Wistar Rats (viewarticle.aspx?articleid=732)
Atakpa I. Attah, Egbung G. Eneji, Itam E. Hogan
https://doi.org/10.26538/tjnpr/v4i8.23 (https://doi.org/10.26538/tjnpr/v4i8.23)

Design, Development and Evaluation of the Repellent Activity of *Azadirachta indica* Oil-Based Solid Lipid Microparticles against *Aedes aegypti* (Linn) (viewarticle.aspx?articleid=733)

Chinekwu S. Nwagwu, John D. N. Ogbonna, Lotanna G. Nwobi, Adaeze C. Echezona, Chinenye N. Ugwu, Ezimwanne N. Ezeibe, Angela C. Ozioko, Petra O. Nnamani, Anthony A. Attama

https://doi.org/10.26538/tjnpr/v4i8.24 (https://doi.org/10.26538/tjnpr/v4i8.24)

# Tropical Journal of Natural Product Research

<table>
<thead>
<tr>
<th>Country</th>
<th>Nigeria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Area and Category</td>
<td>Biochemistry, Genetics and Molecular Biology, Biochemistry, Molecular Medicine, Chemistry, Analytical Chemistry, Medicine, Complementary and Alternative Medicine, Pharmacology, Toxicology and Pharmaceutics, Drug Discovery, Pharmaceutical Science, Pharmacology</td>
</tr>
<tr>
<td>Publisher</td>
<td>Faculty of Pharmacy, University of Benin</td>
</tr>
<tr>
<td>Publication type</td>
<td>Journals</td>
</tr>
<tr>
<td>ISSN</td>
<td>26160692, 26160684</td>
</tr>
<tr>
<td>Coverage</td>
<td>2017-2020</td>
</tr>
</tbody>
</table>

**Scope**

The Tropical Journal of Natural Product Research is open access, peer-reviewed international journal aimed at making important contributions in the field of Natural Product Research, Pharmaceutical and Natural Sciences. The journal covers all aspects of Pharmaceutical research, chemistry and biochemistry of naturally occurring compounds, ethnomedicine, ethnopharmacology, pharmacognosy, biomedical research, biotechnology and related disciplines. The journal welcome submissions from a broad spectrum of scientific endeavour involving biological evaluation of natural substances of plant, microbial and animal origin against different disease targets, processes or therapeutic strategies that can lead to or assist in the prevention and management of chronic and infectious diseases, clinical therapeutics, isolation and characterization of metabolites, structure elucidation, synthesis and experimental biosynthesis of natural Product as well as developments of methods in these areas. Research papers in the fields of chemistry-biology boundary, e.g. fermentation chemistry, plant tissue culture investigations etc. are also welcomed. Although the journal focuses mainly on original research articles, timely, concise and focused reviews on recent progress in active areas of natural Product is also encouraged.
Quartiles

<table>
<thead>
<tr>
<th>Category</th>
<th>Year</th>
<th>Quartile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytical Chemistry</td>
<td>2019</td>
<td>Q4</td>
</tr>
<tr>
<td>Biochemistry</td>
<td>2019</td>
<td>Q4</td>
</tr>
<tr>
<td>Complementary and Alternative Medicine</td>
<td>2019</td>
<td>Q4</td>
</tr>
<tr>
<td>Drug Discovery</td>
<td>2019</td>
<td>Q4</td>
</tr>
<tr>
<td>Molecular Medicine</td>
<td>2019</td>
<td>Q4</td>
</tr>
<tr>
<td>Pharmaceutical Science</td>
<td>2019</td>
<td>Q4</td>
</tr>
<tr>
<td>Pharmacology</td>
<td>2019</td>
<td>Q4</td>
</tr>
</tbody>
</table>

SJR

- Analytical Chemistry: 0.13
- Biochemistry: 0.13
- Complementary and Alternative Medicine: 0.13
- Drug Discovery: 0.13
- Molecular Medicine: 0.13
- Pharmaceutical Science: 0.13
- Pharmacology: 0.13

Citations per document

- 2017: 0.000
- 2018: 0.191
- 2019: 0.164

External Cites per Doc

- 2017: 0
- 2018: 0.04
- 2019: 0.12

% International Collaboration

- 2017: 0%
- 2018: 40%
- 2019: 80%
Metrics based on Scopus® data as of April 2020

- Citable documents
- Non-citable documents
- Cited documents
- Uncited documents

Table:

<table>
<thead>
<tr>
<th>Year</th>
<th>Uncited documents</th>
<th>Cited documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2018</td>
<td>44</td>
<td>0</td>
</tr>
<tr>
<td>2019</td>
<td>126</td>
<td>0</td>
</tr>
</tbody>
</table>

Graphs show trends in citations and uncitations over the years 2017 to 2019.
The users of Scimago Journal & Country Rank have the possibility to dialogue through comments linked to a specific journal. The purpose is to have a forum in which general doubts about the processes of publication in the journal, experiences and other issues derived from the publication of papers are resolved. For topics on particular articles, maintain the dialogue through the usual channels with your editor.
Dear Dr Aminah,
Thank you for submitting your manuscript to the Tropical Journal of Natural Product Research. The peer-review process will start immediately. The Editorial team will get back to you as soon as the peer review process is completed.

Please send the names and contact addresses of two reviewers, including their email addresses.

Have a nice day

Best regards
Abiodun

Professor Abiodun Falodun, PhD,

Editor-in-Chief:
Tropical Journal of Natural Product Research (TJNPR)
Head, Natural Product Research Group, University of Benin
Email: editor.tjnpr@uniben.edu; editor.tjnpr@gmail.com
www.tjnpr.org SCOPUS, SCImago SJR Q3 0.13
https://www.scopus.com/sources.uri

Professor of Pharmaceutical Chemistry
Fellow, Fulbright (USA)
Deputy Vice-Chancellor (Academic) 2014-2016
Faculty of Pharmacy
University of Benin
Phone: +234-807-318-4488;
email: faloabi@uniben.edu; abiodun.falodun@fulbrightmail.org
Google Scholar Citations

University of Benin
TJNPR SCOPUS Q3
www.uniben.edu www.tjnpr.org

nanik siti aminah <nanik-s-a@fst.unair.ac.id>  Tue, Jul 14, 2020 at 5:09 PM
To: editor.tjnpr@gmail.com

Dear

Professor Abiodun Falodun, PhD,

Editor-in-Chief:
Greeting from Universitas Airlangga, Surabaya, Indonesia

I am happy to receive your e-mail, and I hope the manuscripts we send are suitable for publication in your journal. Attached, I will send the names of two prospective reviewers as you requested. Thank you for your help and cooperation.

Best regard,
Dr. Nanik Siti Aminah
Assoc. Professor on Natural Product Chemistry
Dept. of Chemistry
Faculty of Science and Technology
Universitas Airlangga

Vice Dean on Research and Partnership
Faculty of Science and Technology
Universitas Airlangga
Komplek Kampus C UNAIR
Jl. Ir. Soekarno Surabaya-East Java
Indonesia
e-mail address: nanik-s-a@fst.unair.ac.id

--

Best regards
Abiodun

Professor Abiodun Falodun, PhD,
Editor-in-Chief: Tropical Journal of Natural Product Research (TJNPR)
Head, Natural Product Research Group, University of Benin
Email: editor.tjnpr@uniben.edu; editor.tjnpr@gmail.com
www.tjnpr.org SCOPUS, SCImago SJR Q3 0.13
https://www.scopus.com/sources.uri

Professor of Pharmaceutical Chemistry
Fellow, Fulbright (USA)
Deputy Vice-Chancellor (Academic) 2014-2016
Faculty of Pharmacy
Dear Dr Aminah,

Received. Thank you

Best regards

Abiodun

Professor Abiodun Falodun, PhD,

Editor-in-Chief: Tropical Journal of Natural Product Research (TJNPR)
Head, Natural Product Research Group, University of Benin
Email: editor.tjnpr@uniben.edu; editor.tjnpr@gmail.com
www.tjnpr.org SCOPUS, SCImago SJR Q3 0.13
https://www.scopus.com/sources.uri

Professor of Pharmaceutical Chemistry
Fellow, Fulbright (USA)
Deputy Vice-Chancellor (Academic) 2014-2016
Faculty of Pharmacy
University of Benin
Phone: +234-807-318-4488;
email: faloabi@uniben.edu; abiodun.falodun@fulbrightmail.org
Google Scholar Citations

[Quoted text hidden]
Sear Dr Aminah,

The manuscript submitted to the Tropical Journal of Natural Product Research (TJNPR) has been carefully reviewed by competent experts. Find attached the details of the decision.

Please send your response urgently to the editor-in-Chief, to enable us to process your manuscript for the next issue Vol 4 issue 8, August 2020.

Kindly acknowledge the receipt of the mail.

Title: Coumarins and Carbazole Alkaloid from Clausena excavata Roots Collected in Myanmar

Authors: Tin M. Thant, Nanik S. Aminah,* Alfinda N. Kristanti, Rico Ramadhan, Iffa H. Hasna, Hnin T. Aung, Yoshiaki Takaya

Accepted with some major corrections/revisions

Congratulations

Best regards

Abiodun

Professor Abiodun Falodun, PhD,

Editor-in-Chief:
Tropical Journal of Natural Product Research (TJNPR)
Head, Natural Product Research Group, University of Benin
Email: editor.tjnpr@uniben.edu; editor.tjnpr@gmail.com
www.tjnpr.org SCOPUS, SCImago SJR Q3 0.13
https://www.scopus.com/sources.uri

Professor of Pharmaceutical Chemistry
Fellow, Fulbright (USA)
Deputy Vice-Chancellor (Academic) 2014-2016
Faculty of Pharmacy
University of Benin
Phone: +234-807-318-4488;
email: falabi@uniben.edu; abiodun.falodun@fulbrightmail.org
Google Scholar Citations
SCOPUS https://www.scopus.com/authid/detail.uri?authorId=12794326500#top

University of Benin TJNPR SCOPUS Q3
www.uniben.edu www.tjnpr.org
Best regards

Abiodun

Professor Abiodun Falodun, PhD,

Editor-in-Chief:
Tropical Journal of Natural Product Research (TJNPR)
Head, Natural Product Research Group, University of Benin
Email: editor.tjnpr@uniben.edu; editor.tjnpr@gmail.com
www.tjnpr.org SCOPUS, SCImago SJR Q3 0.13
https://www.scopus.com/sources.uri

Professor of Pharmaceutical Chemistry
Fellow, Fulbright (USA)
Deputy Vice-Chancellor (Academic) 2014-2016
Faculty of Pharmacy
University of Benin
Phone: +234-807-318-4488;
email: faloabi@uniben.edu; abiodun.falodun@fulbrightmail.org
Google Scholar Citations
SCOPUS https://www.scopus.com/authid/detail.uri?authorId=12794326500#top

University of Benin TJNPR SCOPUS Q3
www.uniben.edu www.tjnpr.org
Assalamu alaikum Wr. Wb.

We are happy to receive good news from you that our manuscript accepted, even though with major revision.

Insyaallah I will do transfer the fee on Monday, July 27, 2020, and will send to you the receipt of the payment.

Thank you for your kind help and cooperation.

With best regard,

Nanik

[Quoted text hidden]

--
Dr. Nanik Siti Aminah

Assoc. Professor on Natural Product Chemistry
Dept. of Chemistry
Faculty of Science and Technology
Universitas Airlangga

Vice Dean on Research and Partnership
Faculty of Science and Technology
Universitas Airlangga
Komplek Kampus C UNAIR
Jl. Ir. Soekarno Surabaya-East Java
Indonesia
email address: nanik-s-a@fst.unair.ac.id

Editor-in-Chief Tjnpr <editor.tjnpr@gmail.com>  Fri, Jul 24, 2020 at 5:14 PM
To: nanik-s-a@fst.unair.ac.id

--
[Quoted text hidden]

nankan sita aminah <nanik-s-a@fst.unair.ac.id>  Mon, Jul 27, 2020 at 9:43 PM
To: Editor-in-Chief Tjnpr <editor.tjnpr@gmail.com>

Dear Professor Abiodun Falodun, PhD,

Editor-in-Chief:
Tropical Journal of Natural Product Research (TJNPR)

I have sent the payment of publication charge for Article TJNPR 1009ROctot398TJNPR
Title: Coumarins and Carbazole Alkaloid from Clausena excavata Roots Collected in Myanmar.

by Bank transfer. The name of Bank is "MANDIRI BANK".

The Receipt from the bank in the attached file.

I Hope, you can send the comment of the reviewer.
Thank you for your kind help and cooperation.

With best regard,

Nanik

On Fri, Jul 24, 2020 at 4:12 PM Editor-in-Chief Tjnpr <editor.tjnpr@gmail.com> wrote:

[Quoted text hidden]

[Quoted text hidden]

---

2 attachments

- BPAYMENT RECEIPT FORTNJPR.jpeg
  202K

- SURAT ACCEPTENCE_Provisional acceptance 89.pdf
  168K

---

Editor-in-Chief Tjnpr <editor.tjnpr@gmail.com>  Mon, Jul 27, 2020 at 9:53 PM

To: nanik siti aminah <nanik-s-a@fst.unair.ac.id>

Dear Dr Aminah,

Your mail acknowledged. The review comments will be sent in less than 48hrs time.

Best regards

Abiodun

---

Professor Abiodun Falodun, PhD,

Editor-in-Chief:
Tropical Journal of Natural Product Research (TJNPR)
Head, Natural Product Research Group, University of Benin
Email:editor.tjnpr@uniben.edu; editor.tjnpr@gmail.com
www.tjnpr.org SCOPUS, SCImago SJR Q3 0.13
https://www.scopus.com/sources.uri

Professor of Pharmaceutical Chemistry
Fellow, Fulbright (USA)
Deputy Vice-Chancellor (Academic) 2014-2016
Faculty of Pharmacy
University of Benin
Phone: +234-807-318-4488;
email: faloabi@uniben.edu; abiodun.falodun@fulbrightmail.org
Google Scholar Citations
SCOPUS https://www.scopus.com/authid/detail.uri?authorId=12794326500#top
Dear Author,

Find Attached the galle
y proof of your article titled "Coumarins and Carbazole Alkaloid from Clausena excavata Roots and Investigation of their α-glucosidase Inhibitory Activity"

We request you go through carefully to ensure no error has been made.

Also, respond to the comments indicated in the galley proof.

Please, return the corrected galley proof as quickly as possible (on or before Wednesday 19th August, 2020).

Best regards

Abiodun

------------------------------------------------------------------------------------------------------

Professor Abiodun Falodun, PhD

Editor-in-Chief: Tropical Journal of Natural Product Research (TJNPR)
Head, Natural Product Research Group, University of Benin
Email: editor.tjnpr@uniben.edu; editor.tjnpr@gmail.com
www.tjnpr.org SCOPUS, SCImago SJR Q3 0.13
https://www.scopus.com/sources.uri

Professor of Pharmaceutical Chemistry
Fellow, Fulbright (USA)
Deputy Vice-Chancellor (Academic) 2014-2016
Faculty of Pharmacy
University of Benin
Phone: +234-807-318-4488;
email: faloabi@uniben.edu; abiodun.falodun@fulbrightmail.org
Google Scholar Citations
SCOPUS https://www.scopus.com/authid/detail.uri?authorId=12794326500#top
nanik sitiaminah <nanik-s-a@fst.unair.ac.id>
To: Managing Editor TJNPR <p.editor.tjnpr@gmail.com>

Dear
Managing Editor TNJPR

Herewith, I send the revise of our manuscript (with yellow block).
I hope this revision meets the requirements for publish of this manuscript.

Thank you very much for your kind help and cooperation.

With best regard,

[Quoted text hidden]
[Quoted text hidden]

2 attachments
nanik siti aminah <nanik-s-a@fst.unair.ac.id>  
To: Managing Editor TJNPR <p.editor.tjnpr@gmail.com>  

Sun, Aug 30, 2020 at 11:34 PM

Dear Managing Editor TNJPR

Thu, Aug 20, 2020, I have sent The revise of the galley proof of our article as the forward email. But on Fri, Aug 28, 2020, I received an email as the attached file.

Would you like to give me an explanation?

Thank you very much for your kind help and cooperation.

Best regard,
Nanik

---------- Forwarded message ----------
From: nanik siti aminah <nanik-s-a@fst.unair.ac.id>  
Date: Thu, Aug 20, 2020 at 3:48 AM  
Subject: Re: Galley Proof of Your Article  
To: Managing Editor TJNPR <p.editor.tjnpr@gmail.com>  

Dear
Managing Editor TNJPR

Herewith, I send the revise of our manuscript (with yellow block). I hope this revision meets the requirements for publish of this manuscript.

Thank you very much for your kind help and cooperation.

With best regard,

3 attachments

TJNPR-2020-M075 Galley Proof, REVISED 19 AUGUST 2020.docx  
118K

383K

SEE THE STATUS TNJPR.pdf  
95K