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INVESTIGATING METHYL AND NITRO SUBSTITUENTS AFFECT IN PARA POSITION ON N-BENZOYL-N'-PHENYLTHIOUREA COMPOUNDS AS POTENTIAL TREATMENTS FOR BREAST CANCER

D. Kesuma, R. R. Risthanti✉ and I. G. A. Sumartha
Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Universitas Surabaya, Surabaya, Indonesia, 60293
✉Corresponding Author: reineristhanti@staff.ubaya.ac.id

ABSTRACT

The primary challenge in chemotherapy for breast cancer stems from the limited effectiveness of existing drugs due to the diverse mutations, each requiring specific treatment. Consequently, it is essential to focus on the development of drugs specifically designed for anti-breast cancer therapy. In this investigation, we synthesized and evaluated compounds with methyl and nitro substituents on the para position in N-benzoyl-N'-phenylthiourea to examine their efficacy against breast cancer cells (MCF-7). Computational analyses demonstrated favorable interactions with EGFR, and experimental tests revealed IC50 values of 0.42 mM for the first compound and 0.07 mM for the second compound. Remarkably, the second molecule showed enhanced selectivity and cytotoxicity (SI value of 937.57) in comparison to the first compound, suggesting that it could be a promising drug for the treatment of breast cancer.

Keywords: Molecular Docking, Breast Cancer, EGFR, Phenylthiourea, Cytotoxic Activity.
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INTRODUCTION

Breast cancer is a prominent cancer type in Indonesia, ranking first in prevalence according to Pathological Based Registration data, with a relative frequency of 18.6%. Projections suggest a potential increase to 25.7% by 2030. Despite the effectiveness of current treatments like breast-conserving therapy and mastectomy, the importance of chemotherapy remains. However, the complexity of addressing diverse mutations in breast cancer requires specific drugs, emphasizing the urgent need for drug development to identify potential candidates as raw materials for anti-breast cancer therapy.[1-4] An essential function of the Epidermal Growth Factor Receptor (EGFR) is to relay signals required for cellular growth. Changes or mutations in the EGFR regulatory system can result in increased EGFR expression, leading to uncontrolled cell growth, a phenomenon notably observed in several cancers, including breast cancer. Approximately 25%-30% of individuals with breast cancer demonstrate overexpression of EGFR, a characteristic linked to unfavorable clinical outcomes.[5-8] Chemotherapeutic agents developed specifically for breast cancer treatment encompass derivatives such as thiourea and phenylthiourea. Li synthesized several phenylthiourea derivatives, and one of these showed good action against HER-2 and EGFR enzymes. Additionally, these derivatives demonstrated inhibitory effects on MCF-7 cell proliferation. In Kesuma et al.'s study, two phenylthiourea derivatives synthesized displayed cytotoxic activity against MCF-7 cells, surpassing that of hydroxyurea and erlotinib. Topliss modifications of the aromatic ring of the molecule can be used to create derivatives that affect physicochemical factors (lipophilic, electronic, and steric) in the Hansch model. Drug solubility in distribution is influenced by electronic parameters, drug penetration into cell membranes is improved by lipophilic parameters, and the strength of drug interactions with receptors is linked to steric parameters.[9-12] The research focuses on derivatives of phenylthiourea, specifically N-(4-Methyl)-Benzoyl-N'-Phenylthiourea (first compound) and N-(4-Nitro)-Benzoyl-N'-Phenylthiourea (second compound), emphasizing their interaction with the Epidermal Growth Factor Receptor (EGFR). Before synthesis, computational predictions were utilized to evaluate the cytotoxic potential of these compounds. Then each synthesized compound is analyzed to identify its structure

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elucidation. Using MCF-7 cells, in vitro cytotoxicity was assessed using the tetrazolium microculture (MTT) method. The resultant IC50 values were compared to reference chemicals hydroxyurea and erlotinib, where erlotinib was used as a clinical reference to suppress the proliferation of cancer cells. Examining normal Vero cells allowed for the determination of selectivity for cancer cells. This study aimed to identify a novel phenylthiourea-derived compound with potential as an anti-breast cancer candidate by predicting its ability to inhibit EGFR.

EXPERIMENTAL

Materials

EGFR receptor with PDB code 1M17 and a set of computers with programs for in silico testing. MCF-7 cancer cells, Vero cells, first compound and second compound compounds, Erlotinib, HU, and in vitro cytotoxic test reagents purchased from local suppliers, and also a set of tools for in vitro cytotoxic testing.

Docking Using *Molegro* Virtual Docker (MVD)

EGFR (1M17) with erlotinib standard ligand was selected. Docking was performed using MVD, generating rerank scores for compounds. Environmental conditions of compounds and receptors were analyzed (lipophilic, electronic, and hydrogen bonding properties). Amino acids and rerank score values in the interaction process were compared.

Cytotoxicity Against MCF-7 Cells

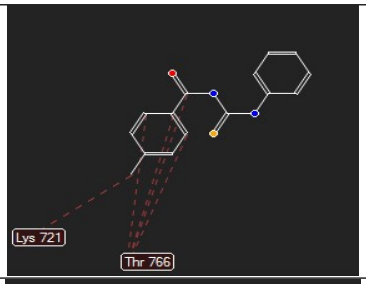
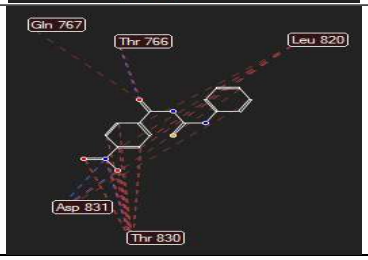
MCF-7 and Vero cells were cultured in 96-well plates and incubated for a full day. Subsequently, various concentrations of HU, erlotinib, and the experimental compounds were added to the wells, while control wells contained a cell-free culture medium. After the 24-hour incubation period, PBS was used to wash the wells. 500 ppm of MTT reagent (100 µL) was added, and the mixture was incubated for four hours. Ten percent SDS in 0.01 n HCl (100 µL) was added to dissolve the formazan crystals and eliminate the MTT response. Following established protocols, the absorption was measured using an ELISA reader at 595 nms. IC50 values were determined through probit analysis. The ratio of IC50 for normal cells to IC50 for cancer cells was used to determine the selectivity for cancer cells.[19,20]

RESULTS AND DISCUSSION

In Silico Cytotoxicity Assessment

The in-silico test results for the first compound, second compound, and reference compound are presented in Table-1. Molecular docking results revealed distinct interactions between the test compounds and reference compounds on EGFR, potentially elucidating variations in in vitro activity tests.

Table-1: In Silico Test Results: Ligands' In Silico Docking Value at the EGFR Receptor: (PDB Code: 1M17)

Ligand	Rerank Score (kcal/mol)	Interactions
First compound	-78.0707	
Second compound	-90.1688	

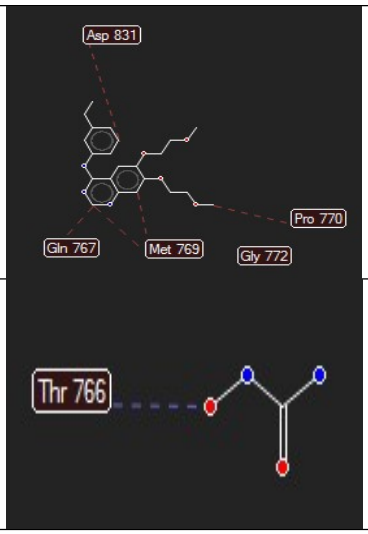
Erlotinib	-92.0274			
Hydroxyurea	-38.4495			
RMSD = 1.95361				

Table-2: Amino Acids and Chemical Bonds Involved in the Interaction Process of BPTU Compounds and the Derivatives and Comparison Compounds to EGFR Receptors

No.	Compound Name	Amino Acid							
		Lys 721	Thr 766	Gln 767	Met 769	Pro 770	Leu 820	Thr 830	Asp 831
1.	4-CH_3-BFTU	1S	4S	-	-	-	-	-	-
2.	4-NO_2-BFTU	-	1H /1S	1S	-	-	6S	4H/ 9S	2H /4S
3.	HU	-	1H/1S	-	-	-	-	-	-
4.	Erlotinib	-	-	1S	2S	1S	-	-	1S

Notes: H: hydrogen bond interaction; S: Van der Waals and hydrophobic interaction

Based on the results of molecular docking, the rerank score for the second compound was smaller than that for the first compound but not much different from the rerank score for erlotinib. This shows that the second compound is predicted to have better activity than the first compound, but is close to erlotinib as a comparison. Further analysis showed an interaction between the amino acids Gln767, Met769, and Asp831 with erlotinib. In contrast, the second compound showed an interaction of hydrogen bonds with Thr830 and Thr766 which allowed the test compound to have better in vitro activity than erlotinib.

Characteristics of First Compound and Second Compound

The structures of the first compound and second compound were identified through IR spectroscopy, NMR, and HRMS spectroscopy. The infrared spectrum of the modified chemical first compound produced with KBr pellets is illustrated in Fig.-1.

Figure-2 shows the 1H-NMR spectra of the first chemical compound in the DMSO-d6 solvent.

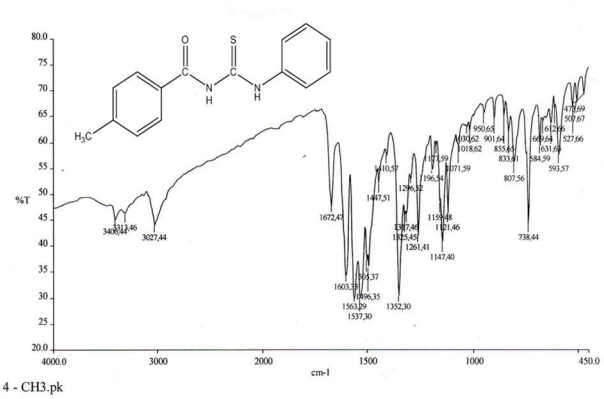


Fig.-1: First Compound Infrared Spectrum

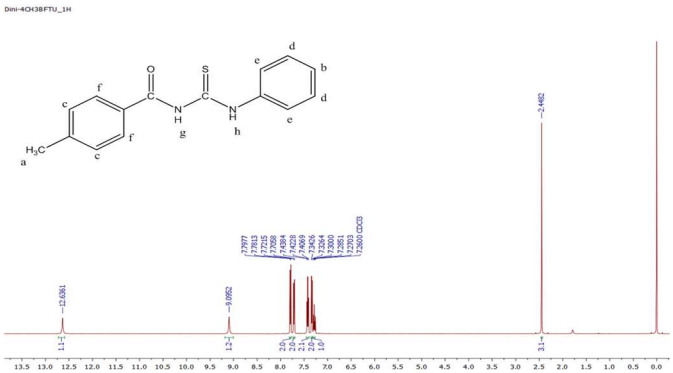


Fig.-2: First Compound ^{1}H-NMR Spectrum (500 MHz)

By examining Fig.-2, it becomes evident that there are multiple peaks in certain shift regions, providing information about the positions and quantities of hydrogen (proton) atoms in the synthesized compound. The ^{13}C-NMR spectrum of the first compound using DMSO-d_6 solvent can be seen in Fig.-3.

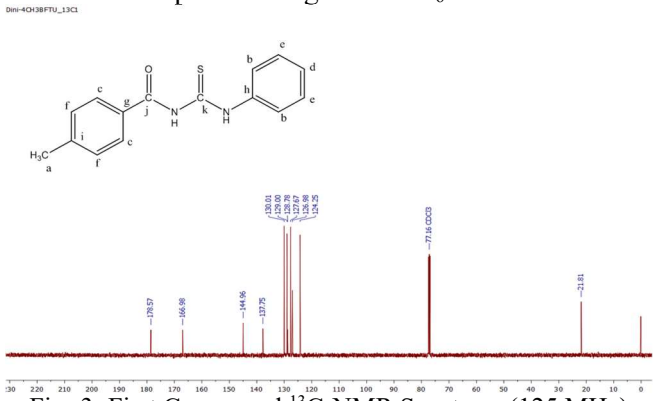


Fig.-3: First Compound ^{13}C-NMR Spectrum (125 MHz)

Figure-4 shows the mass spectrometry spectrum of the first chemical compound in the DMSO-d6 solvent.

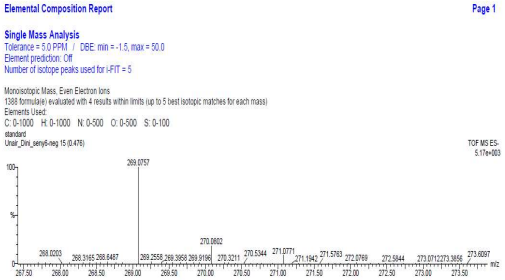


Fig.-4: The Mass Spectrometry Spectrum (ESI-HRMS) of the First Compound Using DMSO-d_6 Solvent

The infrared spectrum of the modified second compound obtained using KBr pellets can be seen in Fig.-5.

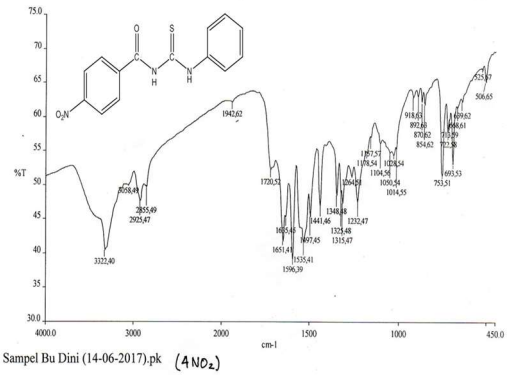


Fig.-5: The IR Spectrum of the Second Compound

The 1H-NMR spectrum of the second compound using DMSO-d_6 solvent can be seen in Fig.-6.

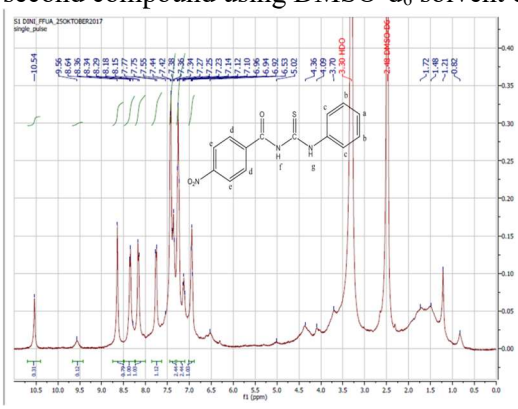


Fig.-6: The 1H-NMR Spectrum of the Second Compound (500 MHz)

Based on Fig.-6, several peaks can be observed in specific shift regions, indicating the position and the number of hydrogen (proton) atoms in the synthesized compound. The ^{13}C-NMR spectrum of the second compound using DMSO-d_6 solvent can be seen in Fig.-7.

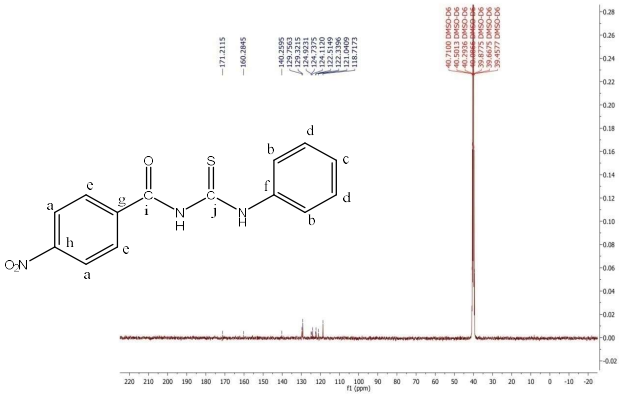


Fig.-7: ^{13}C-NMR Spectrum of the Second Compound (125 MHz)

The mass spectrometry spectrum of the second compound using DMSO-d_6 solvent can be seen in Fig.-8.

In-vitro Cytotoxicity Test

The IC50 values for the substance's first compound and second compound were determined by analyzing the outcomes of the cytotoxicity test conducted on MCF-7 cells. According to Table 4's in vitro test results, compounds generated from the second compound have lesser IC50s (0,07 and 0,42 mM) than the first compound. These findings are consistent with Table 1's docking results. Both the second and first compounds exhibited more cytotoxic action than the reference compounds. The second compound molecule has a lower IC50 value than the first compound compound, indicating that it has a stronger cytotoxic activity. An assessment of drug safety often involves measuring selectivity, expressed as the selectivity index (SI). Table-4 reveals SI values of 937.57 and 127.57 for the second and first compounds, respectively, signifying that both test compounds displayed considerable selectivity for MCF-7 cancer cells with SI values exceeding 2. Notably, the second compound exhibited a higher SI value than the first, indicating superior selectivity.

Table-4: Results of IC50 and SI of Test Compounds and Reference Compounds

Compounds	IC_{50} (mM) MCF-7 cells	IC_{50} (mM) Vero cells	Selectivity Index (SI)
First compound	0.42	53.58	127.57
Second compound	0.07	65.63	937.57
Hydroxyurea	9.76	-	-
Erlotinib	0.92	-	-

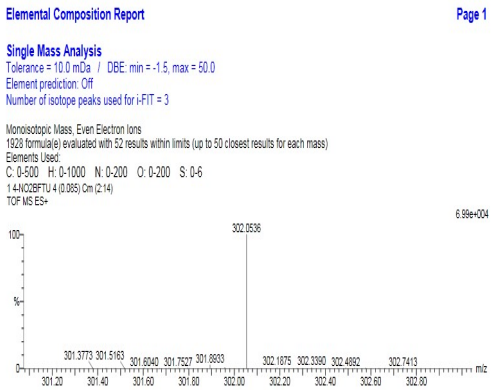


Fig.-8: Mass Spectrometry Spectrum (ESI-HRMS) of the Second Compound using DMSO-d_6 Solvent

CONCLUSION

The second and first compounds exhibited greater cytotoxic activity in vitro and in silico than the reference compounds. When compared to the first compound, the second compound exhibited more cytotoxic activity and selectivity against MCF-7 cancer cells.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTIONS

All the authors contributed significantly to this manuscript, participated in reviewing/editing, and approved the final draft for publication. The research profile of the authors can be verified from their ORCID IDs, given below:

Dini Kesuma https://orcid.org/0000-0002-6612-372X
Reine Risa Risthanti https://orcid.org/0009-0003-1165-6793
I. Gede Ari Sumartha https://orcid.org/0000-0002-6950-3795

REFERENCES

1. R. I. Kemenkes, Pusat Data dan Informasi Kemenkes RI, Jakarta: Kementrian Kesehatan Republik Indonesia (2019)
2. https://gco.iarc.fr/
3. T. A. Moo, R. Sanford, C. Dang, M. Morrow, *Overview of Breast Cancer Therapy,* **13(3)**, 339(2018), https://doi.org/10.1016/j.cpet.2018.02.006
4. G. Curigliano, C. Criscitiello, *Progress in Tumor Research*, **41**, 15(2014), https://doi.org/10.1159/000355896
5. M. Singh, and H. R Jadhav, *Drug Discovery Today*, **23(3)**, 745(2018), https://doi.org/10.1016/j.drudis.2017.10.004
6. N. Yamashita, M. Kondo, S. Zhao, W. Li, K. Koike, K. Nemoto, Y. Kanno, *Bioorganic & Medicinal Chemistry Letters*, **231**, 3(2017).
7. A.A. Zulkifli, F.H. Tan, T.L. Putoczki, S.S. Stylli, R.B. Luwor. *Molecular and Cellular Endocrinology*, **451**, 15(2017), https://doi.org/10.1016/j.mce.2017.01.010
8. V.S. Hawthorne, W.C. Huang, C.L. Neal, L.M. Tseng, M.C. Hung, D. Yu. *Molecular Cancer Research*, **7(4)**, 592(2009), https://doi.org/10.1158/1541-7786.MCR-08-0316
9. H.Q. Li, T. Yan, Y. Yang, L. Shi, C.F. Zhou, H.L. Zhu. *Bioorganic & Medicinal Chemistry*, **18(1)**, 305(2009), https://doi.org/10.1016/j.bmc.2009.10.054

10. D. Kesuma, Siswandono and A. Kirtishanti. *Rasayan Journal of Chemistry*, **15(2)**, 1503(2022), https://doi.org/10.31788/RJC.2022.1526836
11. B.T. Purwanto, Siswandono, D. Kesuma, T. Widiandani and I. Siswanto, *Rasayan Journal of Chemistry*, **14(2)**, 1341(2021), https://doi.org/10.31788/RJC.2021.1426196
12. D. Kesuma, A.L. Nasyanka, M. Rudyanto, Siswandono, B.T. Purwanto and I.G.A. Sumartha, *Rasayan Journal of Chemistry*, **13(3)**, 1914(2020), https://doi.org/10.31788/RJC.2020.1335694
13. W. Yang, Y. Hu, Y.S. Yang, F. Zhang, Y.B. Zhang, X.L. Wang, J.F. Tang, W.Q. Zhong and H.L. Zhu. *Bioorganic & Medicinal Chemistry*, **21(5)**, 1050(2013), https://doi.org/10.1016/j.bmc.2013.01.013
14. V. Murugan, S. Revathi, K. Sumathi, K.M. Geetha and K. Divekar, *Asian Journal of Research in Chemistry*, **3(2)**, 496(2010)
15. D.L. Pavia, G.M. Lampman, G.S. Kriz, R. James and J.R. Vyvyan, Spectroscopy 4th ed, Brooks/Cole, France, p. 851-886 (2009)
16. P.A. Patil, R.P. Bhole, R.V. Chikhale, K.P. Bhusari and A. Chandekar, *Asian Journal of Research in Chemistry*, **3(3)**, 531(2010).
17. https://ccrc.farmasi.ugm.ac.id/?page_id=240
18. V.A. Kangralkar and A.R. Kulkarni. *Research Journal of Pharmacy and Technology*, **6(11)**, 1240(2013).
19. D. Satria, J. Silalahi, G. Haro, S. Ilyas and P.A.Z. Hasibuan. *Rasāyan Journal of Chemistry*, **12(2)**, 803(2019), https://doi.org/10.31788/RJC.2019.1225180
20. V. Venkataramireddy, M. Shankaraiah, A.T. Rao, Ch. Kalyani, M.L. Narasu, R. Varala and A. Jayashree, *Rasayan Journal of Chemistry*, **9(1)**, 31(2016).

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Research Interest: Organic synthesis, Natural Products, waste management

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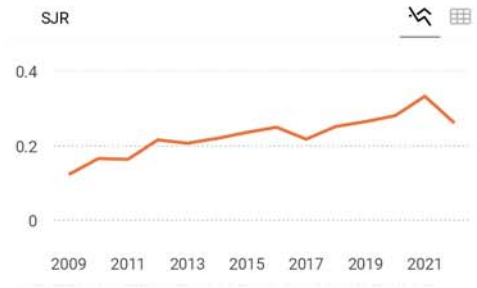

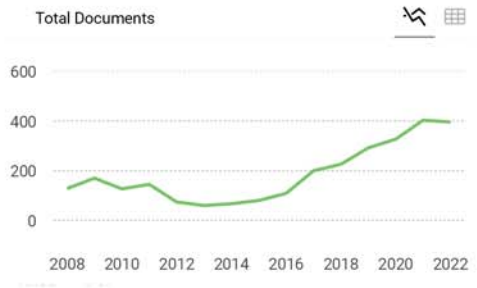

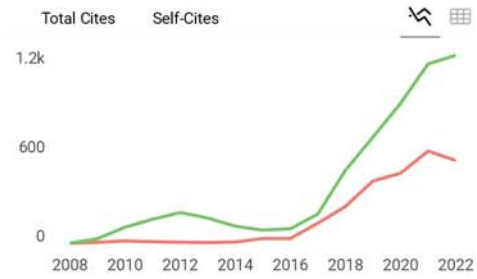

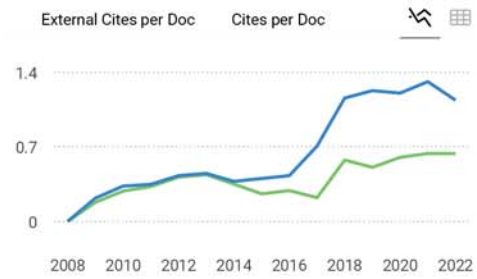

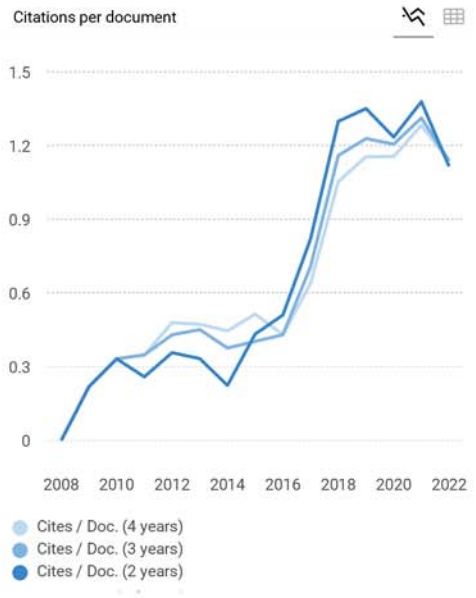

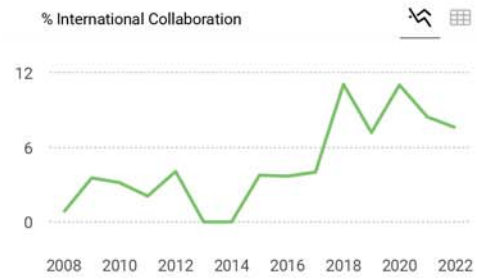

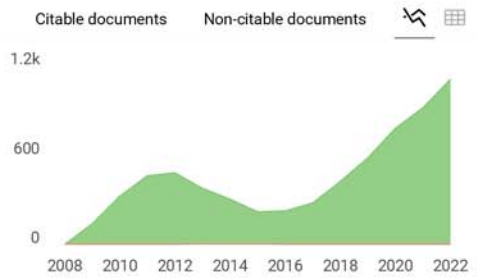

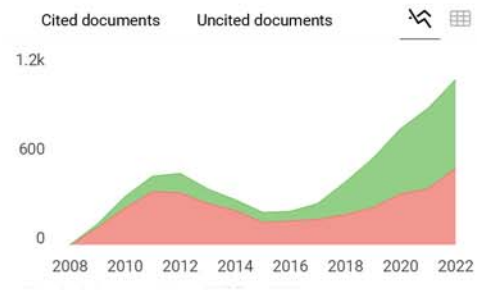

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P **Pinki** 2 months ago

What is the impact factor of this journal?

reply

SCImago Team

Melanie Ortiz 2 months ago

Dear Pinki, thank you very much for your comment. SCImago Journal and Country Rank uses Scopus data, our impact indicator is the SJR (Check it above). 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

T **Talant Sirojov** 5 months ago

Unfortunately, this journal has been dropped/discontuned by Scopus as of July 2023.
Please be aware.
Thank you.

reply

S **Sutopo Hadi** 5 months ago

Dear All,

Unfortunately, this journal has been dropped/discontuned by Scopus as of July 2023.
Please be aware.
Thank you.

reply

A **Andi Nafisah Tendri Adjeng** 5 months ago

It has been continued by scopus, please re-check again in https://www.scopus.com/sourceid/19400157518.

A **Ahmad Najib** 11 months ago

Dear Melanie

If there is no discontinuance notification, even though for example the coverage till 2021, is Scopus still covering it?

reply

T **tony augustine** 1 year ago

Is this journal has any impact factor.

reply

SCImago Team

Melanie Ortiz 1 year ago

Dear Tony, thank you very much for your comment. SCImago Journal and Country Rank

uses Scopus data, our impact indicator is the SJR (Check it above). 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

A **Abhishek Kumar** 2 years ago

Kindly add the article, "THIAZOLE DERIVATIVES AS POTENTIAL ANTIDIABETIC AGENTS" published in Rasayan J. Chem http://doi.org/10.31788/RJC.2021.1456665 in Scopus.

reply

SCImago Team

Melanie Ortiz 2 years ago

Dear Abhishek,
thank you very much for your comment, unfortunately we cannot help you with your request. We suggest you contact Scopus support team: https://service.elsevier.com/app/answers/detail/a_id/14883/kw/scimago/supporthub/scopus/
Best Regards, SCImago Team

C **C. VEERAVEL** 3 years ago

DEAR SIR,
I HAVE SUBMITTED A MANUSCRIPT BEFORE 20 DAYS . KINDLY GIVE ME STATUS OF MANUSCRIPT.

THANK YOU

reply

SCImago Team

Melanie Ortiz 3 years ago

Dear Veeravel,
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 contact the journal's editorial staff , so they could inform you more deeply.
Best Regards, SCImago Team

S **SANTOSO** 4 years ago

I want to publish my paper in your journal.

How long it takes to respond to the search?

reply

S **Saronom Silaban** 4 years ago

Dear, Elena Corera

How do I know if this Journal was indexed on Scopus in 2020 or not?

Thank you

reply

SCImago Team

Melanie Ortiz 4 years ago

Dear Saronom, thank you very much for your comment, unfortunately we cannot help you with your request. We suggest you to consult the Scopus database directly. Remember that the SJR is a static image of a database (Scopus) which is changing every day. Best regards, SCImago Team

A **Asmaa B. Al Dabbagh** 4 years ago

DEAR SIR
I want to publish my research in your magazine what are the publishing fees،

How long it takes to respond to the search,And how to send the search

reply

A **Asmaa B. Al dabbagh** 4 years ago

Dear Sir
Iwant to sent my paper in your journal pleas tell me the cost of publishing?

reply

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Source details

Rasayan Journal of Chemistry

Scopus coverage years: from 2008 to 2023

(coverage discontinued in Scopus)

Publisher: Rasayan Journal

ISSN: 0974-1496 E-ISSN: 0976-0083

Subject area: Pharmacology, Toxicology and Pharmaceutics: General Pharmacology, Toxicology and Pharmaceutics

Energy: General Energy | Chemistry: General Chemistry | Chemical Engineering: General Chemical Engineering

Biochemistry, Genetics and Molecular Biology: Biochemistry

Source type: Journal

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SJR 2022
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