DESCRIPTION

*Journal of Advanced Research* (abbreviated as J. Adv. Res.) is an applied/natural sciences, peer-reviewed journal with interdisciplinary activity. The journal aims to make significant contributions to applied research and knowledge across the globe through publication of original, high-quality research articles in the following fields:

1) Medicine

2) Pharmaceutical Sciences

3) Dentistry

4) Physical Therapy

5) Veterinary Medicine

6) Basic and Biological Sciences such as: biology, molecular biology, biotechnology, chemistry, physics, biophysics, geology, astronomy, biophysics and environmental science.

7) Mathematics, Engineering, and Computer Sciences and

8) Agricultural Science

In addition to original research articles, *Journal of Advanced Research* publishes reviews, mini-reviews, case reports, letters to the editor, and commentaries, thereby providing a forum for reports and discussions on cutting edge perspectives in science. All submitted papers are subjected to strict single blind peer reviewing process. The Journal is committed to publishing manuscripts via a rapid, impartial, and rigorous review process. Once accepted, manuscripts are granted free online open-access immediately upon publication, which permits its users to read, download, copy, distribute, print, search, or link to the full texts, thus facilitating access to a broad readership. The journal is published 6 times per year.

**Papers accepted for publishing are open access with a publishing fee of 650 USD. Authors from certain countries or areas are eligible for discounts following Research4life**
IMPACT FACTOR

2018: 5.045 © Clarivate Analytics Journal Citation Reports 2019

ABSTRACTING AND INDEXING

Science Citation Index Expanded
Directory of Open Access Journals (DOAJ)
INSPEC

EDITORIAL BOARD

President of Cairo University
Mohamed O. Elkhosht

Vice President of Cairo University for Graduate Studies and Research
Aiman El-Khatib

Editor-in-Chief
Hussein M. Khaled, National Cancer Institute Cairo University, Cairo, Egypt

Managing Editor
Mohamed Ali Farag, Cairo University Department of Pharmacognosy, Cairo, Egypt

Associate Managing Editor
Marwa Fouad, Cairo University Department of Pharmaceutical Chemistry, Cairo, Egypt

Associate Editors
A. M. Abd El-Aty, Cairo University, Giza, Egypt
Fathy Abdel-Ghaffar, Cairo University Faculty of Science, Cairo, Egypt
Nour T. Abdel-Ghani, Cairo University Faculty of Science, Cairo, Egypt
Samy Abdel-Samad, Cairo University Faculty of Physical Therapy, Cairo, Egypt
Amr A. Adly, Cairo University Electrical Power and Machines Department, Giza, Egypt
Rashad S. Barsoum, Cairo University Internal Medicine Department, Cairo, Egypt
Mostafa Bedewy, University of Pittsburgh Swanson School of Engineering, Pittsburgh, United States
Ali H. Eid, American University of Beirut, Faculty of Medicine, Department of Pharmacology and Toxicology, Beirut, Lebanon
Abir T. El-Alfy, Medical College of Wisconsin, Department of Biopharmaceutical Sciences, Wisconsin, United States
Hossam El Beltagi, Cairo University Faculty of Agriculture, Cairo, Egypt
Ehab A. El-Danaf, Cairo University Mechanical Design and Production Department, Giza, Egypt
Omaima Naim El-Gazayerly, Cairo University Department of Pharmaceutics and Industrial Pharmacy, Giza, Egypt
Rashika A. F. El Ridi, Cairo University Department of Zoology, Cairo, Egypt
Hesham R. El-Seedi, Uppsala University, Biomedical Centre, Division of Pharmacognosy, Department of Medicinal Chemistry, Uppsala, Sweden
Hany A. El Shemy, Cairo University Department of Biochemistry, Cairo, Egypt
Mostafa Elshahed, Oklahoma State University Stillwater Department of Microbiology and Molecular Genetics, Stillwater, United States
Gamal Esmat, Cairo University Kasr Alainy Faculty of Medicine, Cairo, Egypt
Mohamed Ali Farag, Cairo University Department of Pharmacognosy, Cairo, Egypt
Angelo de Fatima, Federal University of Minas Gerais Department of Chemistry, BELO HORIZONTE, Brazil
Mohamed Abdel Harith, Cairo University National Institute of Laser Enhanced Sciences Department of Laser Applications in Metrology Photochemistry and, Giza, Egypt
Mohamed Fawzy Ramadan Hassani, Zagazig University Faculty of Agriculture, Zagazig, Egypt
Yousry M. Issa, Cairo University Department of Chemistry, Giza, Egypt
Firas Kobeissy, American University of Beirut Department of Biochemistry and Molecular Genetics, Beirut, Lebanon
Jin-Ming Lin, Tsinghua University Department of Chemistry, Beijing, China
Federica Migliardo, University of Messina Department of Biological and Environmental Sciences, Messina, Italy
Enas Mobarak, Cairo University Department of Restorative Dentistry, Giza, Egypt
Luzia Modolo, Federal University of Minas Gerais Department of Botany, BELO HORIZONTE, Brazil
Guilherme Oliveira, Vale Institute of Technology Sustainable Development, BELEM, Brazil
Vincenzo Palleschi, Institute of Organo-metallic Chemistry National Research Council Pisa Branch, Pisa, Italy
Luca Quartuccio, University of Udine, Udine, Italy
Gafar M. Ragab, Cairo University Internal Medicine Department, Cairo, Egypt
Olfat Gamil Shaker, Cairo University Kasr Alainy Faculty of Medicine, Cairo, Egypt
Ahmed M. Soliman, Cairo University Department of Electronics and Electrical Communications Engineering, Giza, Egypt
Manoel D. Sousa-Neto, University of Sao Paulo Faculty of Dentistry of Ribeirao Preto, RIBEIRAO PRETO, Brazil
Nasser H. Sweilam, Cairo University Faculty of Science, Cairo, Egypt
Edwin J.A. Veldhuizen, Utrecht University Department of Infectious Diseases and Immunology, Utrecht, Netherlands
Ahmed I. Zayed, DePaul University Department of Mathematics, Chicago, United States

Executive Editors
Shorouk El Shennawy, Cairo University, Giza, Egypt
Mohamed Youssef, Cairo University, Giza, Egypt

Editorial Advisory Board - Pharmacy
Abdel A Abdel-Rahman, East Carolina University, Greenville, United States
Abeer M. Al-Ghananeem, University of Kentucky, Lexington, United States
Abir El-Alfy, Chicago State University, Chicago, United States
Paul W. Pare, TEXAS TECH UNIVERSITY, Lubbock, United States

Editorial Advisory Board - Veterinary Medicine
Alaa El-Din A. Bekhit, University of Otago, Dunedin, New Zealand
Elisa Escudero, University of Murcia, Murcia, Spain
Robert Linhardt, Rensselaer Polytechnic Institute, Troy, United States
Thomas Loch, Michigan State University, East Lansing, United States
Gen Watanabe, Tokyo University of Agriculture and Technology Faculty of Agriculture Graduate School of Agriculture Department of Veterinary Medicine Department of V, Tokyo, Japan

Editorial Advisory Board - Agriculture
Ladislav Kokoska, Czech University of Life Sciences Prague, Praha, Czech Republic
David Lightfoot, Southern Illinois University Carbondale, Carbondale, United States
Karl Schellander, University of Bonn, Bonn, Germany

Editorial Advisory Board - Engineering
M. Sherif Aggour, University of Maryland at College Park, College Park, United States
Pak Kwong Chan, Nanyang Technological University, Singapore, Singapore
Alan Gertler, Desert Research Institute, Reno, United States
Tarek Saadawi, City College of New York, New York, United States
Tarek M. Sobh, University of Bridgeport, Bridgeport, United States

Editorial Advisory Board - Medicine
Mohd Fuat Abd Razak, Institute for Medical Research, Kuala Lumpur, Malaysia
Mohamed Bahie B. Abou-Donia, Duke University Medical Center, Durham, United States
Tawfik Ayoub, University of Southern California, Los Angeles, United States
W. Winn Chatham, University of Alabama at Birmingham
Sayed Dauod, Washington State University, Pullman, United States
Amr Edrees, University of Missouri Kansas City, Kansas City, United States
Agnes B. Fogo, Vanderbilt University School of Medicine, Nashville, United States
Saleh Ibrahim, University of Lubeck, Lubeck, Germany
Gaku Ichihara, Nagoya University, Nagoya, Japan
Richard J. Johnson, University of Colorado Denver, Denver, United States
Parveen Kumar, Queen Mary University of London, London, United Kingdom
Francesco Negro, University of Brescia, Switzerland
Nicholas Pavlidis, University of Ioannina, Ioannina, Greece
Jan Van Meerbeeck, Universitair Ziekenhuis Gent, Gent, Belgium
Fulco van der Veen, Academic Medical Center, Amsterdam, Netherlands

Editorial Advisory Board - Science
Adolfo Ballester-Bolinches, University of Valencia, Valencia, Spain
Huan-Tsong Chang, National Taiwan University Chemistry Department, Taipei, Taiwan
Neil Coville, University of the Witwatersrand, Johannesburg, South Africa
Farouk El-Baz, Boston University, Boston, United States
Mostafa El-Sayed, Georgia Institute of Technology, Atlanta, United States
Muhammad Jamil, Konkuk University College of Global Integrated Studies, Gwangjin-gu, Korea, Republic of
Hian Kee Lee, National University of Singapore, Singapore, Singapore
Liang Li, University of Alberta Department of Chemistry, Edmonton, Canada
Luzia Valentina Modolo, Federal University of Minas Gerais, Belo Horizonte, Brazil
Giuseppe Patane, Institute of Applied Mathematics and Information Technologies Enrico Magenes National Research Council Genoa Branch, Genova, Italy
Svetozara Petrova, Bielefeld University of Applied Sciences, Bielefeld, Germany
Jae-Han Shim, Chonnam National University, Gwangju, Korea, Republic of
Markus Sigrist, Swiss Federal Institute of Technology, Zurich, Switzerland
Michael Spiteller, TU Dortmund University, Dortmund, Germany
Frantisek Svec, University of California Berkeley, Berkeley, United States
José Luis Tadeo, National Institute for Agricultural and Food Research and Technology, Madrid, Spain
Marek Trojanowicz, University of Warsaw, Warszawa, Poland

Editorial Advisory Board - Physical therapy
Olfat Mohamed, California State University Long Beach, Long Beach, United States
Zbigniew Sliwinski, Jan Kochanowski University in Kielce, Kielce, Poland
GUIDE FOR AUTHORS

Editorial policy and general information
The Journal of Advanced Research (JAR) publishes original articles in the fields of the basic sciences, applied sciences and technology, biomedical sciences, and related disciplines. JAR seeks to publish high-quality papers that: 1) describe significant and novel findings; and 2) advanced knowledge in a diversity of scientific fields in the form of original articles, short communications, reviews, case reports, or letters to the editor.

Review process
Manuscripts are evaluated on the basis that they present new insight into the investigated topic and are likely to contribute to research progress or a change in clinical practice. It is understood that all authors listed on a manuscript have agreed to its submission. The signature of the corresponding author on the letter of submission signifies that these conditions have been fulfilled. Received manuscripts will initially be examined by the JAR editorial office and those deemed to have insufficient grounds for publication may be rejected without external evaluation. Manuscripts not prepared in the advised style described below will be sent back to authors for correction. The authors will be notified with the reference number once the manuscript has been assigned to an Editor. The assigned manuscripts will be sent to 2-4 independent experts for scientific evaluation. The evaluation process commonly takes an average of 1-3 months.

Permissions
Authors wishing to include figures, tables, or text that have already been published elsewhere are required to obtain permission from the copyright owner(s) for both the print and online format and to include evidence that such permission has been granted when submitting their papers. Any received material lacking such evidence will be assumed to originate from the authors.

Disclaimer
Every effort is made by the publisher and editorial board to ensure that no inaccurate or misleading data or statements appear in the Journal of Advanced Research. However, they wish to make it clear that the data and opinions appearing in the articles herein are the responsibility of the authors concerned. Accordingly, the publisher and the editorial board accept no liability whatsoever for the consequences of any inaccurate or misleading data or statements, intentional or not.

Articles types
JAR seeks to publish experimental and theoretical research results of outstanding significance in the form of original articles, short communications, reviews, case reports, or letters to the editor.

Original articles: Articles which represent in-depth research in various scientific disciplines. Short communications: Should be complete manuscripts of significant importance. However, their length and/or depth do not justify a full-length paper. The total number of figures and tables should not exceed 6. The number of words should be = 3,000 Review articles: Should normally comprise less than 10,000 words; contain unstructured abstract and includes up-to-date references. Meta-analyses are considered as reviews. Special attention will be paid to the teaching value of review papers. Mini reviews: These are reviews of important and recent topics that are presented in a concise and well-focused manner. The number of words is limited to 5,000 words. Case reports: A detailed report of the symptoms, signs, diagnosis, treatment, and follow-up of an individual patient (i.e., clinically important information on common and rare conditions). Letter to the editor for comments on recently published articles. Special reports: Papers may be accepted on the basis that they provide a systematic, critical and up-to-date overview of literature pertaining to research or clinical topics.

BEFORE YOU BEGIN

Ethics in publishing
Please see our information pages on Ethics in publishing and Ethical guidelines for journal publication.

Ethical approval
Studies on patients or volunteers require Ethics Committee and/or Independent Review Board (IRB) approval, and, where relevant, the patients' written informed consent, which should be documented in the Methods section of the paper with the approval number. If such a study was not approved by the
appropriate Ethics Committee or IRB, a statement as to why it was exempted should be included. The Editors reserve the right to refuse publications where the required ethical approval/patient consent is lacking.

**Human and animal rights**
The JAR editors endorse the principles embodied in the revised Declaration of Helsinki (2008) ([59th WMA General Assembly, Seoul, Republic of Korea, October 2008](#)) and expect that all investigations involving humans would have been performed in accordance with these principles. For animal experimentation, it is expected that investigators have abided by the Interdisciplinary Principles and Guidelines for the Use of Animals in Research, Testing, and Education issued by the New York Academy of Sciences Adhoc Committee on Animal Research. All human and animal studies must have been approved by the investigator's Institutional review board.

For studies involving human subjects, download the letter from [here](#).
For studies involving animals (fisheries), download the letter from [here](#).
For studies that do not involve human or animal subjects (Basic sciences), download the letter from [here](#).

**Conflict of Interest (mandatory)**
A conflict of interest may exist when an author or the author's institution has financial or other affiliations with people or organizations that may inappropriately influence the author's work. A conflict can be actual or potential and full disclosure to the journal is the safest course. All submissions to the journal must include disclosure of any relationships that could be viewed as potential conflicts of interest. The journal may use such information as a basis for editorial decisions and may publish such disclosures if they are believed to be important to readers in judging the manuscript. This declaration (with the heading "Conflict of interests") should be uploaded among the files submitted on the EES. Additional information regarding conflicts of interest can be found at [http://www.wame.org/conflict-of-interest-editorial#ref1](http://www.wame.org/conflict-of-interest-editorial#ref1).

Download the statement from [here](#).

**Submission declaration and verification**
Submission of an article implies that the work described has not been published previously (except in the form of an abstract, a published lecture or academic thesis, see 'Multiple, redundant or concurrent publication' for more information), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. To verify originality, your article may be checked by the originality detection service Crossref Similarity Check.

**Use of inclusive language**
Inclusive language acknowledges diversity, conveys respect to all people, is sensitive to differences, and promotes equal opportunities. Articles should make no assumptions about the beliefs or commitments of any reader, should contain nothing which might imply that one individual is superior to another on the grounds of race, sex, culture or any other characteristic, and should use inclusive language throughout. Authors should ensure that writing is free from bias, for instance by using 'he or she', 'his/her' instead of 'he' or 'his', and by making use of job titles that are free of stereotyping (e.g. 'chairperson' instead of 'chairman' and 'flight attendant' instead of 'stewardess').

**Changes to authorship**
Request to changes in authorship is not allowed once the paper is accepted. In case any such changes needs to be made then the author would have to withdraw his paper and resubmit it with the new author details in the Editorial System.

**Copyright**
Upon acceptance of an article, authors will be asked to complete a 'Copyright Transfer Agreement'. Acceptance of the agreement will ensure the widest possible dissemination of information. Subscribers may reproduce tables of content or prepare lists of articles including abstracts for internal circulation within their institutions. Permission from Cairo University is required for resale or distribution outside the institution and for all other derivative works, including compilations and translations.

*Elsevier supports responsible sharing*
Find out how you can [share your research](#) published in Elsevier journals.
**Role of the funding source**
Please list the source(s) of funding for the study, for each author, and for the manuscript preparation in the acknowledgements section. List all contributors who do not meet the criteria for authorship, such as technical assistants, writing assistants or head of department who provided only general support. Financial and other material support should be disclosed and acknowledged.

**Open access**
Please visit our Open Access page for more information.

**Open access**
The Journal of Advanced Research is an open access journal: all articles will be immediately and permanently free for everyone to read and download. To provide open access, this journal has an open access fee of USD 650 excluding taxes (also known as an article publishing charge APC) which needs to be paid by the authors or on their behalf e.g. by their research funder or institution. If accepted for publication in the Journal following peer review, authors will be notified of this decision and at the same time requested to pay the article processing charge. A CC user license manages the reuse of the article (see https://www.elsevier.com/openaccesslicenses). All articles will be published under the following license

*Creative Commons Attribution-NonCommercial-NoDerivs (CC BY-NC-ND)*
For non-commercial purposes, lets others distribute and copy the article, and to include in a collective work (such as an anthology), as long as they credit the author(s) and provided they do not alter or modify the article.

**Elsevier Researcher Academy**
Researcher Academy is a free e-learning platform designed to support early and mid-career researchers throughout their research journey. The "Learn" environment at Researcher Academy offers several interactive modules, webinars, downloadable guides and resources to guide you through the process of writing for research and going through peer review. Feel free to use these free resources to improve your submission and navigate the publication process with ease.

**Language**
Manuscripts must be written in English in a clear and concise manner. Any author who is not fluent in idiomatic English is urged to seek assistance with manuscript preparation prior to submission. Reviewers are not expected to correct grammatical errors and any deficiency in this area may detract from the scientific content of the paper and result in acceptance delays or rejection.

**Submission**
Our online submission system guides you stepwise through the process of entering your article details and uploading your files. The system converts your article files to a single PDF file used in the peer-review process. Editable files (e.g., Word, LaTeX) are required to typeset your article for final publication. All correspondence, including notification of the Editor's decision and requests for revision, is sent by e-mail.

*Submit your article*
Please submit your article via http://ees.elsevier.com/jare

*Referees*
Please submit the names and institutional e-mail addresses of several potential referees. For more details, visit our Support site. Note that the editor retains the sole right to decide whether or not the suggested reviewers are used.

**General information**
Authors should submit their manuscripts to the editorial office as word files via the Elsevier Editorial System (EES) at http://ees.elsevier.com/jare. The original manuscript should be formatted with double line spacing using Arial or Times New Roman fonts (12 or 14 pt). The text must be in a single-column format with justified margins. Use bold face, italics, subscripts, and superscripts where appropriate. To avoid unnecessary errors, the authors are strongly advised to use the "spell-check" and "grammar-check" functions of their word processing software. Use continuous line numbering throughout the text and all manuscript pages must be numbered at the bottom right corner of each page.

*Revised manuscripts*
The authors must submit the revised version of their submissions within one month of receiving the editorial decision. Revision does not mean that the manuscript will be accepted for publication, as the amended submissions could be sent out for reevaluation. In response to reviewers’ comments, the authors must ensure that each comment is followed by their revision and/or response. In instances where an author disagrees with a comment or suggestion of a reviewer, please justify the reason. Any associated changes in the manuscript must be highlighted on the revised form of the manuscript to facilitate the process of reevaluation.

**Resubmission of a rejected manuscript**

When resubmitting a manuscript previously rejected by JAR, the authors are required to upload the decision letter from the Editor requesting submission of the rejected manuscript, the original reviewer comments of the rejected manuscript, the responses to the reviewer comments, and the original manuscript number. The resubmitted manuscript must indicate, in color, where the revisions were made in the paper in response to the reviewer comments.

**Single blind review**

This journal uses single-blind review, which means that the reviewer name(s) will not be revealed to the author(s) of a manuscript under review. For more information, please refer to [https://www.elsevier.com/reviewers/peer-review](https://www.elsevier.com/reviewers/peer-review).

**Peer review**

This journal operates a single blind review process. All contributions will be initially assessed by the editor for suitability for the journal. Papers deemed suitable are then typically sent to a minimum of two independent expert reviewers to assess the scientific quality of the paper. The Editor is responsible for the final decision regarding acceptance or rejection of articles. The Editor’s decision is final. [More information on types of peer review.](https://www.elsevier.com/reviewers/peer-review)

**Article structure**

**Subdivision**

Authors are urged to be succinct; long papers with many tables and figures may require reductions prior to being processed or accepted for publication. Although there is not an absolute length restriction for original papers, authors are encouraged to limit the text to =5,000 words (including references) and references up to = 40.

**The manuscript should be compiled in the following order:** Title page Abstract, Key words Introduction Material and methods (Experimental or Methodology or Patients and methods) Results Discussion (Results and discussion can be combined in one section) Conclusion Acknowledgment(s) Conflict of Interest References Tables Figures

**Material and methods (Experimental or Methodology or Patients and methods)**

Authors should be as concise as possible in experimental descriptions. The experimental section must contain all of the information necessary to guarantee reproducibility. Previously published methods should be indicated by a reference and only relevant modifications should be described. All vendor details, including company, city, and country, should be mentioned for chemicals, reagents, strains, etc. For statistical analysis, please state the appropriate test(s) in addition to hypothesized p-value or significant level (for example 0.05).

**Results**

The study results should be clear and concise. Restrict the use of tables and figures to depict data that is essential to the message and interpretation of the study. Do not duplicate data in both figures and tables. The results should be presented in a logical sequence in the text, tables and illustrations.

**Discussion**

This should explore the significance of the results of the work, not repeat them. Include in the discussion the implications of the findings and their limitations, how the findings fit into the context of other relevant work, and directions for future research.

**Conclusion(s)**

The main conclusion(s) of the study should be presented in a short conclusion statement that can stand alone and be linked with the goals of the study. State new hypotheses when warranted. Include recommendations when appropriate. Unqualified statements and conclusions not completely supported by the obtained data should be avoided.
**Essential title page information**

The title page should include the following: **Title:** The title should be brief, concise, and descriptive. It should not contain any literature references or compound numbers or non-standardized abbreviations. **Authors and affiliations:** Supply given names, middle initials, and family names for complete identification. Use superscript lowercase letters to indicate different affiliations, which should be as detailed as possible and must include department, faculty/college, University, city with zip code or P.O. Box and country. **Corresponding author:** Should be indicated with an asterisk, and contact details (Tel., fax, and e-mail address) should be placed in a footnote. Short running title (running head) with 80 characters as maximum.

The Manuscript text should include the following:

**Abstract**
Provide an unstructured abstract of no more than 200 words. The abstract should briefly describe the purpose of the study, how the investigation was performed, the most important results and the principal conclusions that were drawn from the results, respectively. References should be avoided, but if essential, then cite the author(s) and year(s). Non-standard or uncommon abbreviations should be avoided, but if essential, be defined at first mention within the abstract.

**Keywords**
Authors are asked to provide (4 to 6) keywords, separated with semicolons. These keywords are used for indexing purposes.

**Introduction**
The author(s) should strive to define the significance of the work and the justification for its publication. Any background discussion should be brief and restricted to pertinent material.

**Acknowledgements**
Please acknowledge individuals/companies/institutions who have contributed to the study, as well as entities providing financial support. A statement of no conflict of interest need to be added at the end of the manuscript.

**(Nomenclature and ) Units**
All measurements and data should be given in SI units where possible, or in other internationally accepted units in parentheses throughout the text. Figures and Tables should use conventional units, with conversion factors given in legends or footnotes.
The preferred forms for some of the more commonly used abbreviations are mp, bp, C, K, min, h, mL, μL, g, mg, μg, cm, mm, nm, mol, mmol, μmol, M, mM, μM, ppm, HPLC, TLC, GC, 1H NMR, GC-MS, HRMS, FABHRMS, UV, IR, EPR, ESR, DNase, ED50, ID50, IC50, LD50, im, ip, iv, mRNA, RNase, rRNA, tRNA, cpm, Ci, dpm, Vmax, Km, k, t1/2.
All non-standard abbreviations should be defined following the first use of the abbreviation.

**Illustrations**
The number of illustrations should be <6 and appropriate for the presented data. Please make sure that artwork files are in an acceptable format (TIFF, EPS or MS Office files) and of high resolution (300 dpi or more). Illustrations should be referred to as Fig. 1, Figs. 2, 3-5, using Arabic numerals. Each illustration must be accompanied by a legend clearly describing it. All aspects of the illustration and legend must be fully understandable in a stand-alone format. Ensure that all tables, figures, and schemes are cited in the text in numerical order. The preferred position for chemical structures should be indicated. All illustrations should be uploaded on separate sheets at the end of the manuscript together with the list of figure legends.

**Color Artwork**
If, together with your accepted article, you submit usable color figures then Elsevier will ensure, at no additional charge that these figures will appear in color on the Web (e.g., ScienceDirect and other sites) in addition to color reproduction in print. For further information on the preparation of electronic artwork, please see [https://www.elsevier.com/artworkinstructions](https://www.elsevier.com/artworkinstructions).

**Tables**
Tables should be <6, and should include only essential data. They should be uploaded on separate sheets with their legends.
**References**

**Text:** Indicate references by Arabic numerals in brackets, which run in order of appearance throughout the text (Vancouver style). For instance [4] or [7-10, 13,15]. The actual authors can be referred to, but the reference number(s) must always be given.

**List:** Number the references (e.g., [2]) in the list in the order in which they appear in the text. Journal names should be abbreviated according to Index Medicus journal abbreviations: http://www.nlm.nih.gov/tsd/serials/lji.html.

http://open.mendeley.com/use-citation-style/journal-of-pharmaceutical-and-biomedical-analysis

**Examples of references** (if 6 or fewer authors, list all; if 7 or more, list first 6 and add "et al."):

- **For journal articles**


- **For articles in press (online)**


- **For Books**


- **For book chapters**


**Web References**

- **For websites**


  For more samples please check:

  http://www.nlm.nih.gov/bsd/uniform_requirements.html

These items should be uploaded via EES in the following order: Cover letter (mandatory) Please upload the completed customized cover letter, which can be downloaded here. Main document, which includes the title page, text, references, tables, and figures (mandatory) Conflict of Interest (mandatory) Compliance with Ethics Requirement (mandatory) Author’s biography (for review articles - mandatory) Include in the manuscript a short (maximum 100 words) biography of each author, along with a passport-type photograph accompanying the other figures. Graphical abstract (mandatory for all except letter to the editor) A Graphical Abstract is a single, concise, pictorial and visual summary of the main findings of the article. This could either be the concluding figure from the
article or a figure that is specially designed for the purpose, which captures the content of the article for readers at a single glance. The Graphical Abstract will be displayed in online contents list and the online article Research Highlights (mandatory) Research highlights should be 5-6 bullets and each bullet should contain no more than 85 characters without numbering.

**Submission Checklist**
The following list will be useful during the final checking of an article prior to sending it to the journal for review. Please consult this Guide for Authors for further details of any item.

**Ensure that the following items are present:**
One author has been designated as the corresponding author with contact details:
- E-mail address
- Phone number(s)
- Fax number
All necessary files have been uploaded, and include: Keywords All figure captions All tables (including title, description, footnotes)
Further considerations Manuscript has been 'spell-checked' and 'grammar-checked' References are in the correct format for this journal All references mentioned in the Reference list are cited in the text, and vice versa Permission has been obtained for use of copyrighted material from other sources (including the Web) Color figures are clearly marked as being intended for color reproduction on the Web (free of charge) and in print, or to be reproduced in color on the Web (free of charge) and in black-and-white in print If only color on the Web is required, black-and-white versions of the figures are also supplied for printing purposes For any further information please visit our customer support site at https://service.elsevier.com

**AFTER ACCEPTANCE**

**Availability of accepted article**
This journal makes articles available online as soon as possible after acceptance. This concerns the accepted article (both in HTML and PDF format), which has not yet been copyedited, typeset or proofread. A Digital Object Identifier (DOI) is allocated, thereby making it fully citable and searchable by title, author name(s) and the full text. The article's PDF also carries a disclaimer stating that it is an unedited article. Subsequent production stages will simply replace this version.

**Proofs**
One set of page proofs (as PDF files) will be sent by e-mail to the corresponding author. Please use this proof only for checking the typesetting, editing, completeness and correctness of the text, tables, and figures. We will do our best to get your article published quickly and accurately. Therefore, it is important to ensure that all of your corrections are sent back in one communication within 48 h. Proofreading is solely your responsibility. Note that the publisher may proceed with the publication of an article if no response is received.

**Offprints**
The corresponding author will be notified and receive a link to the published version of the open access article on ScienceDirect. This link is in the form of an article DOI link which can be shared via email and social networks. For an extra charge, paper offprints can be ordered via the offprint order form which is sent once the article is accepted for publication. Both corresponding and co-authors may order offprints at any time via Elsevier's Author Services.

**Additional information**
Information about scientific meetings that are likely to be of general interest to readers of JAR may be published at the discretion of the editor. These should be sent to the editor as early as possible prior to the event. Text should be as concise as possible, with a maximum of 200 words.

**AUTHOR INQUIRIES**
Visit the Elsevier Support Center to find the answers you need. Here you will find everything from Frequently Asked Questions to ways to get in touch. You can also check the status of your submitted article or find out when your accepted article will be published.

© Copyright 2018 Elsevier | https://www.elsevier.com