

## Review report

**Final title:** [Swimming exercise on spatial memory performance and hippocampal oxidative stress in colchicine-induced memory-impaired male Long-Evans rats](#)

**Title at submission:** Spatial memory impairment by hippocampal oxidative stress - does it be prevented and/or alleviated by swimming exercise? An experimental study in male Long-Evans rats



**Reviewer:** Niazur Rahman, ORCID: [0000-0002-0584-0792](#)

### Overview

This manuscript explores the effects of swimming exercise on spatial memory and hippocampal oxidative stress in colchicine-induced memory-impaired Long-Evans rats. While the study tackles a relevant topic, several concerns undermine its impact. Data presentation is unclear, with insufficient detail to fully support the claims. The conclusions drawn by the authors appear overly strong, given the limited evidence provided. The findings suggest potential therapeutic benefits of swimming exercise for memory impairment and oxidative stress; however, clearer data presentation is necessary to substantiate these claims. Major revisions are required before the manuscript can be considered to be published.

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### Responsible editor

M Mostafa Zaman  
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### Reviewer

Niazur Rahman  
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Shelina Fatema Binte Shahid  
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### Keywords

*memory impairment, oxidative stress, swimming exercise, reference memory, working memory*

### Funding

We did not receive any fund for this research article.

### Ethical approval

Approved by IRB of Bangabandhu Sheikh Mujib Medical University (Reg No: 4470, Date 4 July 2023 ).

### Trail registration number

Not applicable

- |   |                 |                                                                                                                                                                                                                                                                 |
|---|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <b>Comment</b>  | Title: Check for grammatical errors. Consider revising it to a more engaging, statement-type title for better impact.                                                                                                                                           |
|   | <b>Response</b> | Grammatical errors have been checked. The title has been revised to make a more engaging, statement-type title as suggested by the esteemed reviewer (Line 2-3).                                                                                                |
| 2 | <b>Comment</b>  | Line 68: The phrase "leads to cellular abnormalities" is too vague. Specify the exact pathologies and provide appropriate citations.                                                                                                                            |
|   | <b>Response</b> | Exact pathology has been specified and appropriate citation has been provided (Line 67).                                                                                                                                                                        |
| 3 | <b>Comment</b>  | Line 70: The statement "antioxidant is the scavenging molecule" should refer to a group of molecules. Elaborate on this accordingly.                                                                                                                            |
|   | <b>Response</b> | Done accordingly (Line 69-70).                                                                                                                                                                                                                                  |
| 4 | <b>Comment</b>  | Line 71-73: Provide a reference to support this statement.                                                                                                                                                                                                      |
|   | <b>Response</b> | A reference has been provided to support this statement (Line 70-71).                                                                                                                                                                                           |
| 5 | <b>Comment</b>  | Line 76-77: The justification for SwE is not compelling; it is not necessarily more accessible than cycling or running. Revise this argument.                                                                                                                   |
|   | <b>Response</b> | We have revised this argument accordingly (Line 74-75).                                                                                                                                                                                                         |
| 6 | <b>Comment</b>  | Line 100: Include the catalog numbers or composition details for the food used in the study.                                                                                                                                                                    |
|   | <b>Response</b> | A reference has been included which provide the composition of food used in the study (Line 108).                                                                                                                                                               |
| 7 | <b>Comment</b>  | Line 123: Are there recent references available for the procedure and dosage? If so, they should be included.                                                                                                                                                   |
|   | <b>Response</b> | A recent reference has been included regarding procedure. But there is no recent reference available for this dosage as far as we have searched (Line 131).                                                                                                     |
| 8 | <b>Comment</b>  | Line 178-179: Explain why the tissues were not isolated immediately after the final behavioral test.                                                                                                                                                            |
|   | <b>Response</b> | According to a previous research article, rats were euthanized through decapitation under diethyl ether anesthesia, 24 hours following the final behavioral test and then the tissues were isolated immediately. We have provided the reference (Line 186-187). |
| 9 | <b>Comment</b>  | Line 187: Include detailed information on the ELISA protocol in the Methods section.                                                                                                                                                                            |
|   | <b>Response</b> | Detailed information on the ELISA protocol has been included in the methods section (Line 192-194).                                                                                                                                                             |

- 10 **Comment** Conclusion: The claim is too strong given the data, which only suggests that SwE may have some effect on reducing oxidative stress, based solely on MDA and GPx levels. Rephrase to reflect the limitations of the findings.
- Response** We have rephrased conclusion as suggested by the esteemed reviewer (Line 283-287).
- 11 **Comment** Figures:  
Line Graphs (Figure 3A, 4A): The line graphs are confusing due to the numerous significance legends. Consider using an area under the curve (AUC) approach for better visualization.  
Bar Graphs: Include individual data points in a dot/plot representation to enhance data transparency.  
Figure Legends: The legends lack detailed descriptions and do not clearly indicate significance among groups. Additionally, the asterisks and text are too small to differentiate, and overall figure quality needs improvement.
- Response** We have converted figures 3-5 to tables for making the results section reader friendly. Detailed descriptions have been provided and significance among groups have been clearly indicated in table footnote as suggested by the reviewer.
- 12 **Comment** Figures 3, 4, 5: The legend indicates "\* = SC vs ColC," but this is missing in the figures and not specified for the relevant panels.
- Response** We have converted figures 3-5 to tables.
- 13 **Comment** There are several inconsistencies in the presentation of the results that need to be addressed.
- Response** Result section has been revised as suggested by the reviewer (Line 201-246).
- 14 **Comment** The overall grammar and language of the manuscript need careful revision for clarity and correctness.
- Response** Grammatical errors and language have been corrected and clarified as suggested by the esteemed reviewer.

**Reviewer:** Shelina Fatema Binte Shahid, ORCID: [0000-0001-8999-7115](https://orcid.org/0000-0001-8999-7115)

#### Overview

The field of this study is impressive. Needs some minor corrections. Title of the study is too long. Make it concise and avoid question mark in the title. Please clearly state the justification of this research. Instead of experimental design mention that it was a quasi experimental design as sample are not collected randomly. Research procedure should be more organized. did not mention any limitation of the study in discussion section otherwise overall discussion and conclusion of the study was relevant to study purpose.

- 1 **Comment** Is the title appropriate? = No  
Title of this study is too long. Make it concise and do not use question mark.
- Response** We have revised the title to make it concise and statement-type (Line 2-3).
- 2 **Comment** Is the rationale/justification for conducting the study clear? = No  
Justification for conducting the study is not clearly stated. Why the researcher did this study and how the findings of this research contribute to the community should be explained.
- Response** Justification for conducting the study and contribution of the findings of this research to the community have been explained as suggested by the esteemed reviewer (Line 82-91).
- 3 **Comment** Are the methods described in sufficient detail so that the study could be reproduced? = No  
How sample size determined is not clear. Sampling technique also not mentioned. Procedure of the study should be more organized.
- Response** Sample size calculation and sampling technique have been included in method section (Line 97-103). We have provided various procedures, such as, swimming exercise (SwE) protocol, hippocampal colchicine application by stereotaxic surgery, spatial memory assessment by Morris Water Maze (MWM) test, hippocampal oxidative stress marker assessment, data presentation and statistical analysis etc., in different subheadings in method section. We have also provided working plans for different groups of rats in figure 1 and 2 for better understanding of the reader.
- 4 **Comment** Is the study design robust and appropriate to the stated objective(s)? = No  
It was a quasi experimental design as samples are not randomly assigned. But researchers mention that it was experimental design.
- Response** Our experimental animals were 30 Male Long-Evans rats of  $8 \pm 2$  weeks age and  $225 \pm 75$  gram body weight (Line 105-106). Then rats were randomly divided into 5 groups (6 rats/group) (Line 114). So we mentioned that it was experimental design.
- 5 **Comment** Are the table(s) and figure(s) clear and appropriate to address the objective(s)? = No  
Too much figures but no table. It will be better if author could show some tables instead of some figures.
- Response** We have converted figures 3-5 to tables.
- 6 **Comment** Are the number of table(s) and/or figure(s) are appropriate for the manuscript? = No  
Numbers could be decreased.
- Response** We have omitted figure 6 and converted figures 3-5 into 4 tables. Now there are 2 figures and 4 tables. For better understanding of study procedure and results, these figures and tables are necessary.
- 7 **Comment** Does the Discussion section have any repetition of results? = Yes
- Response** Discussion section has been revised to avoid any repetition of results.

**Responsible editor:** M Mostafa Zaman, ORCID: 0000-0002-1736-1342

- 1    Comment    It is not clear why SEM is presented instead of SD.  
    Response    In animal studies, mean  $\pm$  SEM (Standard Error of the Mean) is often preferred over mean  $\pm$  SD (Standard Deviation) because SEM provides a more precise estimate of how well the sample mean represents the population mean, especially when making inferences about the population.
- 2    Comment    The Discussion section's first paragraph should have highlights of the study such major findings. Strengths could be mentioned here as its selling point. Please revise the first paragraph.  
                    There is large repetition of results.  
                    Conclusion should be aligned with the objective.  
    Response    The Discussion section's first paragraph has been revised as suggested by esteemed reviewer (Line 248-251). Discussion section has been revised to avoid any repetition of results. Conclusion has been aligned with the objective (Line 283-287).
- 3    Comment    Presentation of the results is clumsy. There are 6 figure, but all of them are difficult to read and undersatand. On the other hand, there is no table. I suggest converting tables 3-5 to tables making the results section reader friendly.  
    Response    Thank you for your suggestion. Figures 3-5 have been converted to tables for making the results section reader friendly.
- 6    Comment    Are the number of table(s) and/or figure(s) are appropriate for the manuscript? = No  
                    Numbers could be decreased.  
    Response    We have omitted figure 6 and converted figures 3-5 into 4 tables. Now there are 2 figures and 4 tables. For better understanding of study procedure and results, these figures and tables are necessary.
- 7    Comment    Does the Discussion section have any repetition of results? = Yes  
    Response    Discussion section has been revised to avoid any repetition of results.