

Outline Korespondensi “Scientific Reports”

1. Submission – Receipt of manuscript – (29 April 2022)
2. Decision on your manuscript for first review – (15 July 2022)
3. Decision on your manuscript for second review – (19 Oktober 2022)
4. Decision on your manuscript for third review – (15 February 2023)
5. Accepted – (28 February 2023)

The screenshot shows the top navigation bar of the Scientific Reports website, including the logo, search bar, and user options. Below the navigation bar, there are tabs for 'Explore content', 'About the journal', and 'Publish with us'. The main content area displays the article title, authors, and a list of sections. The article title is 'Analysis of contact pressure in a 3D model of dual-mobility hip joint prosthesis under a gait cycle'. The authors listed are Mohammad Tauviqirrahman, Muhammad Imam Ammarullah, J. Jamari, Eko Saputra, Tri Indah Winarni, Febri Dwi Kurniawan, Shidnan Amir Shiddiq, and Emile van der Heide. The article is published in Scientific Reports 13, Article number: 3564 (2023). The abstract section is partially visible at the bottom of the screenshot.

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Article | Open Access | Published: 02 March 2023

Analysis of contact pressure in a 3D model of dual-mobility hip joint prosthesis under a gait cycle

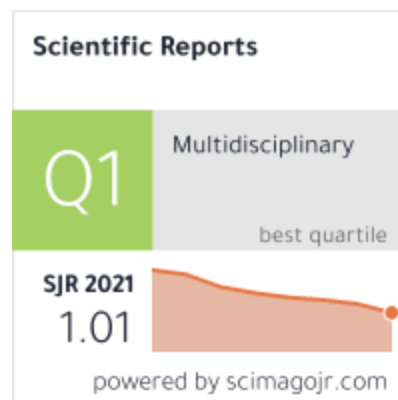
Mohammad Tauviqirrahman, Muhammad Imam Ammarullah, J. Jamari, Eko Saputra, Tri Indah Winarni, Febri Dwi Kurniawan, Shidnan Amir Shiddiq & Emile van der Heide

Scientific Reports 13, Article number: 3564 (2023) | Cite this article

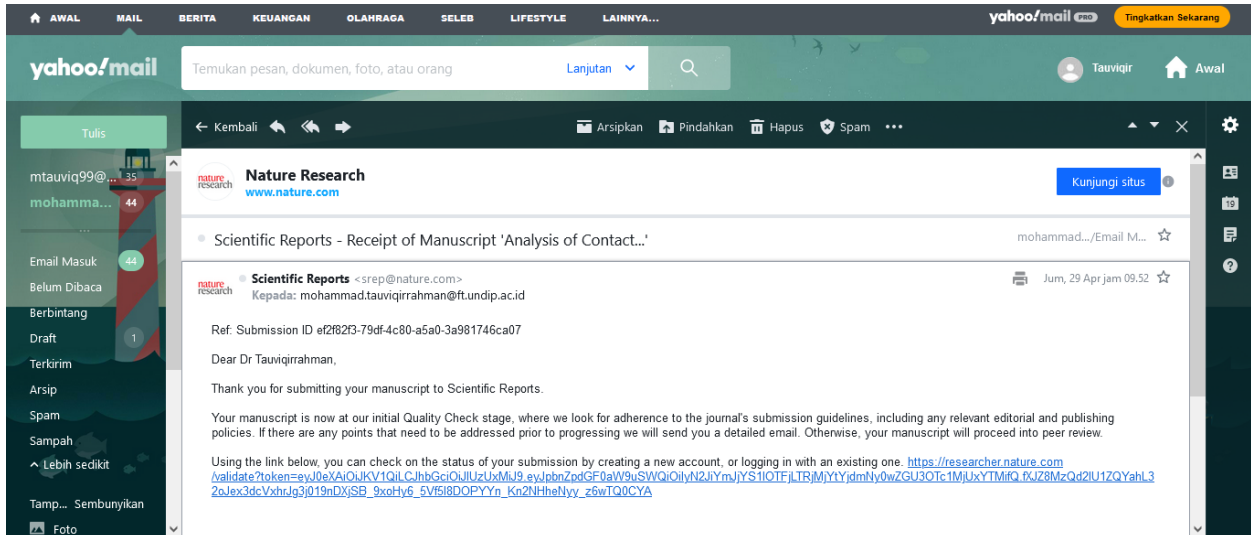
515 Accesses | 1 Altmetric | Metrics

Abstract

Hip joint prostheses are used to replace hip joint function in the human body. The latest dual-



1. Submission – Receipt of manuscript – 29 April 2022



The screenshot shows a Yahoo! Mail interface. The top navigation bar includes 'AWAL', 'MAIL', 'BERITA', 'KEUANGAN', 'OLAHRAGA', 'SELEB', 'LIFESTYLE', and 'LAINNYA...'. The Yahoo! Mail logo is on the left, and a search bar is in the center. The right side shows the user's name 'Tauviqir' and a home icon.

The email content is from 'Nature Research' (www.nature.com). The subject is 'Scientific Reports - Receipt of Manuscript 'Analysis of Contact...''. The sender is 'Scientific Reports <srep@nature.com>' and it is addressed to 'mohammad.tauviqirrahman@ft.undip.ac.id'. The email is dated 'Jun, 29 Apr jam 09.52'.

The body of the email contains the following text:

Ref. Submission ID e2f2f2f3-79df-4c80-a5a0-3a981746ca07

Dear Dr Tauviqirrahman,

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Your manuscript is now at our initial Quality Check stage, where we look for adherence to the journal's submission guidelines, including any relevant editorial and publishing policies. If there are any points that need to be addressed prior to progressing we will send you a detailed email. Otherwise, your manuscript will proceed into peer review.

Using the link below, you can check on the status of your submission by creating a new account, or logging in with an existing one: https://researcher.nature.com/validata?token=avj0eXAJOUJKV1QILCjh9Sci0JlUzUxMl9_eyJpbnZpdGF0aWV3SuSWQl0jlyN2JlYmJYS1l0TFJlTRJMYTYjdmluYmVwZGU3OTc1MjUxYTlMfQ_6JZ6MzQd2UJ1ZQYahl32oLex3dcVxhrljg3j019nDxjSB_9xahY6_5Vf5jDOPYYn_Ko2NihelHyy_z6wTQ0CYA

Scientific Reports - Receipt of Manuscript 'Analysis of Contact...'
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Kepada: mohammad.tauviqirrahman@ft.undip.ac.id
Jum, 29 Apr jam 09.52
Ref: Submission ID ef2f82f3-79df-4c80-a5a0-3a981746ca07

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Using the link below, you can check on the status of your submission by creating a new account, or logging in with an existing one.

https://researcher.nature.com/validate?token=eyJ0eXAiOiJKV1QiLCJhbGciOiJIUzUxMiJ9.eyJpbnZpdGF0aW9uSWQiOiIyN2JiYmJjYS11OTFjLTRjMjYtYjdmNy0wZGU3OTc1MjUxYTMifQ.fXJZ8MzQd2IU1ZQYahL32oJex3dcVxhrJg3j019nDXjSB_9xoHy6_5Vf518DOPYYYn_Kn2NHheNyy_z6wTQ0CYA

Kind regards,

Peer Review Advisors
Scientific Reports

2. Decision on your manuscript for first review – 15 July 2022

The screenshot displays a Yahoo! Mail interface. The top navigation bar includes categories like AWAL, MAIL, BERITA, KEUANGAN, OLAHRAGA, SELEB, LIFESTYLE, and LAINNYA... The search bar contains the text "Temukan pesan, dokumen, foto, atau orang" and a "Lanjutan" dropdown. The left sidebar shows a list of folders: Tulis, mtauqiq99@... (35), mohamma... (44), Email Masuk (44), Belum Dibaca, Berbintang, Draft (1), Terkirim, Arsip, Spam, Sampah, and Lebih sedikit. The main content area shows an email from "Nature Research" with the subject "Scientific Reports: Decision on your manuscript". The email body contains the following text:

Ref. Submission ID ef2f62f3-79df-4c80-a5a0-3a981746ca07

Dear Dr Tauviqirrahman,

Re: "Analysis of Contact Pressure in 3D Model of Dual Mobility Hip Joint Prosthesis by Considering Gait Cycle Position"

We are pleased to let you know that your manuscript has now passed through the review stage and is ready for revision. Many manuscripts require a round of revisions, so this is a normal but important stage of the editorial process.

Editor comments
Both reviewers reported poor study presentation (in substantial part due to language issues) that made impossible for them to fully understanding some aspects of the methodological implementation of your study and their soundness. On top of that, both reviewers highlighted critical missing points in the description of the setup of the finite element simulations (character of the applied loads, boundary conditions etc), their results presentation and their assessment, e.g. lacking of a proper sensitivity and convergence study, improper use of statistical language, etc. Finally, the reviewers feel that the study presents some unsubstantiated claims about stability of the considered prosthesis in comparison to other prosthesis designs, which are not considered in the manuscript. The manuscript will not be considered for publication unless all these points will be fully

Scientific Reports: Decision on your manuscript
mohammad.tauviqirrahman/Email Masuk



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To ensure the Editor and Reviewers will be able to recommend that your revised manuscript is accepted, please pay careful attention to each of the comments that have been pasted underneath this email. This way we can avoid future rounds of clarifications and revisions, moving swiftly to a decision.

Once you have addressed each comment and completed each step listed below, please log in here with the same email you used to submit your manuscript to upload the revised submission and final file:

<https://submission.nature.com/submit-revision/ef2f82f3-79df-4c80-a5a0-3a981746ca07>

Alternatively, please visit <https://researcher.nature.com/your-submissions> to upload your revised submission and to track progress of any other submissions you might have.

CHECKLIST FOR SUBMITTING YOUR REVISION

1. Please upload a point-by-point response to the comments, including a description of any additional experiments that were carried out and a detailed rebuttal of any criticisms or requested revisions that you disagreed with. This must be uploaded as a 'Point-by-point response to reviewers' file.

You'll find a handy one-page PDF on how to respond to reviewers' comments here:

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2. Please highlight all the amends on your manuscript or indicate them by using tracked changes.

3. Check the format for revised manuscripts in our submission guidelines, making sure you pay particular attention to the figure resolution requirements:

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Finally, if you have been asked to improve the language or presentation of your manuscript and would like the assistance of paid editing services, then our expert help at Springer Nature Author Services can help you improve your manuscript through services including English language editing, developmental comments, manuscript formatting, figure preparation, translation, and more.

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To support the continuity of the peer review process, we recommend returning your manuscript to us within 14 days. If you think you will need additional time, please let us know and we will aim to respond within 48 hours.

Kind regards,

Luca Modenese

Reviewer Comments:

Reviewer 1

This paper aimed at presenting an analysis of contact pressure in dual mobility hip joint prosthesis. Specifically, the authors implemented a finite element model in order to estimate the contact pressure in specific positions of the gait cycle (by changing the only inclination angle) and varying the femoral head diameter. The authors reported that the variations in the inclination angle did not change significantly the maximum value of contact pressure on the liner component, whereas the diameter size presented several differences.

General comment

The hypothesis at the basis of this paper is quite clear as well as the main goal. However, the overall level of novelty is quite low at the methodological level; the only innovation is related to the prosthetic design that was analysed. Indeed, the impact is very limited and, further, the paper presented several issues.

The structure of the article seems to be correct (Abstract, Introduction, Materials and Methods, Results [with subheadings], Discussion and Conclusions).

The use of the English language should be deeply revised by a native speaker.

Title

- It is not clear what “Gait Cycle Position” means.

Abstract

- Line 31: Please explain better what “Gait Cycle Position” means.
- Line 32: Please avoid the use of acronyms without introducing them, such as UHMWPE (even if it is clear in this context).
- Line 33: Please give few more details about Finite Element simulation (e.g., load control or displacement control, static/dynamic, explicit/implicit, etc).
- Line 34: I would suggest avoiding using commercial name in the abstract (i.e., Abaqus).
- Line 35: Please give details about the inclination angle variation.
- Line 38-39: We need more numerical information about your results and trends about variations.
- Line 43: Please give a “take-home” message as conclusion of your abstract.

Introduction

- Line 47-48: This sentence is not clear; please explain the concept better.
- Line 50-51: This sentence is not clear; please explain the concept better.
- Line 50-51: This sentence is not clear; please explain the concept better and add a reference.
- Line 58: Th “gait cycle of walking” is redundant; In this case “walking” is enough.
- Line 62-64: This information is irrelevant for this study.
- Line 64: Please explain the concept of “gait position” since it is not clear at all.
- Line 68-72: I would shift this paragraph above, when you reported the information concerning hip prosthesis

In the introduction is missing a section focused on the use of finite element simulation and hip prosthesis.

Methods

- Line 83-90: This section should be placed in the introduction when focusing on the wear problem.
 - Line 93: Please give us more information about how/where did you get geometries.
 - Line 108: Did you perform any sensitivity analysis concerning the type and number of elements.
 - Line 109-111: It is not clear whether the force changed according to the gait cycle in terms of intensity and direction, or not; please give us more information.
 - Line 111-113: Please give more details about boundaries and constraints; from the text and figure they are not clear at all.
 - Table 1 and 2: Please justify these values of sizes and inclination angles.
- In general, we need more information about the simulation (e.g., static/dynamic, explicit/implicit, step, etc.).

Results

- Line 115-122: This is not a proper validation since also Gao et al. performed a simulation; please justify better this section.
- Line 128-129: From this line and figures I finally got that you did simulate the whole gait cycle; why did you chose here 65%? Why did you choose only 6 percentages (0, 20, 36, 50, 65, 100) in gait cycle?. This should be explained in the Methods section.

Discussion

- We need more comparison with other works on FE simulation and hip prosthesis and/or contact pressure, in order to get the values of the information you reported (the pressure are higher/lower with respect to other prosthetic designs? How? Where?).
- Please report also any limitations concerning your work, that is methodological or due to the possibility of generalizing your results.

Conclusions

- Add a proper “take-home” message.

Tables

See previous comments.

Figures

- Figure 2: please explain the yellow lines.

References

The references to previous works seem to be coherent and up-to-date.

Reviewer 2

-Review of Tauviqirrahman et al. 2022.

Title: Analysis of Contact Pressure in 3D Model of Dual Mobility Hip Joint Prosthesis by Considering Gait Cycle Position

Authors: Tauviqirrahman, Jamari, Saptura, Winari, Kurniwan, Heide

Abstract

Hip joint prosthesis is a method to replace hip joint function in the human body. The latest dual mobility hip joint prosthesis has an additional component of an outer liner which acts as a cover for the liner component. Research on the contact pressure generated on the latest model of dual mobility hip joint prosthesis by considering gait cycle position has never been done before. The model is made of UHMWPE on the liner and SS316L stainless steel on the outer liner and cup. Simulation modeling using the finite element method on Abaqus is considered the best method to test the geometry model of dual mobility hip joint prosthesis. In this study, simulation modeling was carried out by varying the inclination angle which was applied to the acetabular cup component. Three-dimensional loads are placed on femoral head reference points with variations of femoral head diameter are used at 22 mm, 28 mm, and 32 mm. The results of the simulation of the dual mobility prosthesis model are the distribution contours and graphs of the maximum contact pressure on the liner inner surface, outer liner outer surface, and cup inner surface. The data results show that the variations of inclination angle do not give a significant effect on the maximum contact pressure value on the liner component. Variations of the femoral head diameter cause differences in the maximum contact pressure value for each used size.

Review:

General comments:

Premise:

The authors utilized a finite element modeling approach to analyze contact pressures on a new design of a hip joint prosthesis, referred to in the paper as a dual mobility hip joint prosthesis, developed by one of the authors (Saputra E.). The new design includes an additional layer to the liner component of the prosthesis made of stainless steel. Contact forces in this design have been analyzed previously by Saptura et al 2016, but the current paper additionally seeks to analyze contact pressures experienced on each component during the gate cycle. An additional aim of this paper sought to analyze the effect of varying the inclination angle at which the acetabular cup is placed, specifically the effect on the contact pressures experienced by each component of the prosthesis. Finally, the authors varied the diameter of the femoral component to analyze the effect of variation on this parameter.

Overall methods approach:

The authors developed a finite element model consisting of meshes of the liner, outer liner, and acetabular cup, with a rigid body defining the force applied by the femoral head during the gait cycle, as taken from the literature (Paul J.P., 1966). Finite element analysis was performed in Abaqus to calculate contact pressures. Variations in the inclination angle of the acetabular cup placement ranging from 30o to 70o were trialed, and max contact pressures calculated during the gait cycle were compared. Additionally, the geometry of the femoral head component of the prosthesis was varied between 22 mm, 28 mm, and 32 mm.

Major findings and interpretation:

During analysis of the inclination analysis, nearly no difference was evident on the max forces experienced by the liner. The other components did experience differences in max pressure during the inclination analysis. The lowest and least variable pressures were experienced when the acetabular cup was placed at 45°. Note that the angles of the liner and outer liner were also set to 45°, and therefore the lowest forces occurred when all components had the same inclination. When varying the diameter of the femoral head, the smallest pressures corresponded to the maximum diameter.

Overall impressions:

Strengths: The manuscript utilizes an analytical finite element approach to apply a more physiologically relevant loading scenario than previously used on this design of THA prosthesis. In addition, the article analyzed the impact of a clinically controllable factor, i.e., the acetabular cup inclination angle, on the forces experienced during gait. Additional knowledge in this area could be of clinical relevance to surgeons performing THA.

Limitations/ weaknesses:

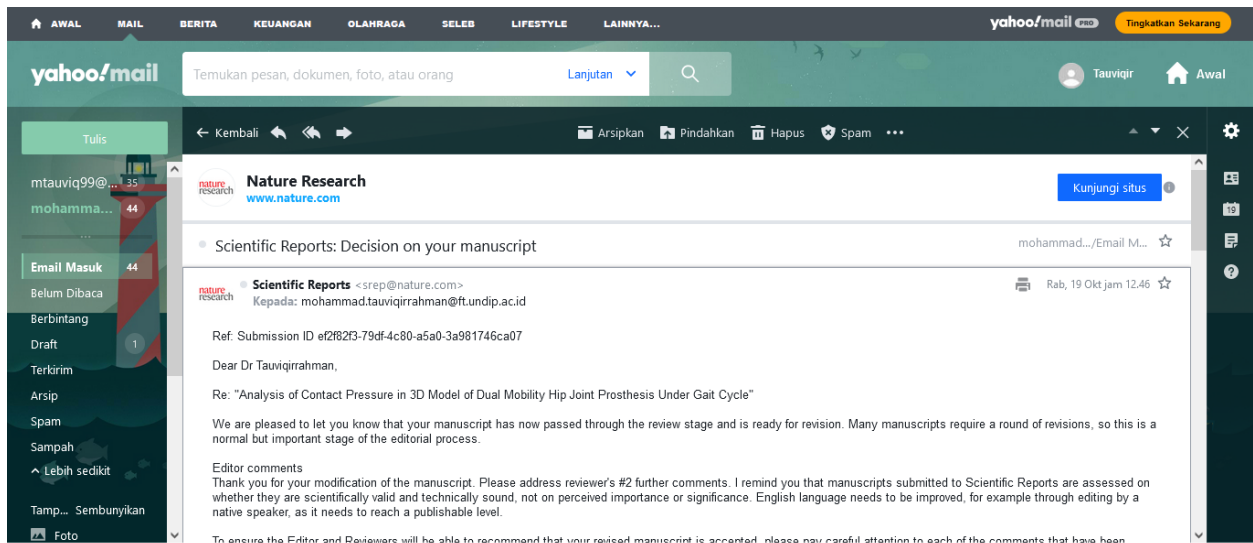
- There were some issues in the grammar that led to confusion regarding what was being compared. Specifically, it was unclear in some instances whether data was being used from a previous paper (which was not directly described in the methodology) or whether it was from comparison between a baseline condition.
 - o e.g. (line 162 in discussion) “The dual mobility hip joint prosthesis model was used in order to reduce the contact pressure on every component of the implant model. Maximum contact pressure generated from the liner, outer liner, and cup showed a lower value on every variation applied.” Lower value on every variation compared to what? As far as this reviewer could tell there was no discussion of using data from previous studies, nor was this data described or tabulated in this manuscript.
- Conclusions were drawn that either were not supported by the data, or were overstated
 - o e.g. (line 181) “The existence of an outer liner that covered the outer surface of the liner based on the implant design according to Saputra et al. [15] had affected the overall resulting contact pressure value of all components, especially the liner. It can be seen from the data graphs that all the curves representing the model with one variation of inclination angle coincide with each other so that all the curves look like a single line. This finding shows that the new (current) dual mobility hip joint prosthesis model tends to be more stable when compared to the conventional design that we have seen on the market.” While this could be supported by the minimized stress variation in the 45° inclination trial, this reviewer believes the nearly identical curves seen in the inner liner are more indicative that the inner liner and outer liner are always aligned, and the inner liner never makes direct contact with the cup, which is the only component with variable inclination. Furthermore, this study never compared this design to previous designs, and therefore the claim that the prosthesis is “more stable” compared to the conventional designs we have seen on the market” is not supported.
 - o e.g. (line 188) “The presence of the outer liner component caused a lower maximum contact pressure value on every implant component.” This paper did not describe any details of a comparison between implants without an outer liner (i.e., previous designs). The only place this could be drawn from is Figure 3 which compares data of a previous model (Gao et al). However, this comparison is only ever described in the results and only addresses one component, the inner liner, not “every component.”

- No comparison to previous implant designs was described. While this was not stated initially as a goal, the authors appeared interested in comparing the designs several times throughout the paper (see above points). The study would indeed be of more clinical impact if this was investigated.
- The “validation” was only ever described in the results. The specifics of how this was carried out/ how the previous data was used and applied were not described in the methods section. This is the only place in the paper where any comparison between models is done and very few details are provided.
- It was unclear how much of an improvement this model provides compared to what has been published before. It is unclear if the authors performed a truly dynamic simulation of gait. Was this dynamic or quasi static at specific timepoints of gait? Additionally, for some reason, the authors do not allow the femur to rotate during gait (line 95). This does not seem physiological.
- The authors did not conduct sensitivity studies to determine how their model predictions are affected by errors in the estimation of model inputs (e.g., variation in material properties).
- It was not made clear as to whether a mesh convergence analysis was conducted (although the authors state in line 108 that element sizes were consistent with the Gao et al. study).
- Why only evaluate/present data at 65% of the gait cycle (line 128)?
- This reviewer recommends that all figures be introduced in parentheses rather than stating, for example, “Figures 6 and 7 (a) show that cup inclination...”
- It was unclear what the significance of reporting the difference between highest and lowest pressure was (line 146). Does this have some bearing on whether the prosthesis will fail or cause problems such as osteolysis? In general, the authors need to better motivate/rationalize their choice of dependent variables.
- It is unclear how the same positions of components created a more optimum contact area (line 149). Why is this more “optimum”?

Specific Comments:

- This reviewer strongly recommends adding labels to identify the various components of the implant. Particularly because the wording in the literature is not universal in how these terms are applied and because the new design introduces an “outer liner.”
- Similarly, it would be helpful to include images of the model in various degrees of inclination. This reviewer suspects this is the purpose of figure 1 left and right; however the caption does not address this and it is left for the reader to assume that is the intent. This could be resolved by adding separate captions for Figure 1 Right and Figure 1 Right and listing the inclination shown in each.
- Several times in the paper “significant” was used without any associated statistical analysis. Assuming that there was no implied statistical significance, a different descriptor should be used in these instances.
- When describing figure 3 in the discussion (line 188) the authors state: “The maximum contact pressure value on the outer liner and cup components when compared to the model by Gao et al. [2] were generally lower.” Figure 3 however does not appear to show this trend visually and in fact the peak pressures during the gait cycle are shown to be lower in the Gao model. This reviewer suspects this is a typo or a mislabeling of figure 3.
- The legend of Figure 5 shows several inclination models, but it appears that only one model is plotted across gait.

3. Decision on your manuscript for Second Review – 19 Oktober 2022



Scientific Reports: Decision on your manuscript
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We are pleased to let you know that your manuscript has now passed through the review stage and is ready for revision. Many manuscripts require a round of revisions, so this is a normal but important stage of the editorial process.

Editor comments

Thank you for your modification of the manuscript. Please address reviewer's #2 further comments. I remind you that manuscripts submitted to Scientific Reports are assessed on whether they are scientifically valid and technically sound, not on perceived importance or significance. English language needs to be improved, for example through editing by a native speaker, as it needs to reach a publishable level.

To ensure the Editor and Reviewers will be able to recommend that your revised manuscript is accepted, please pay careful attention to each of the comments that have been pasted underneath this email. This way we can avoid future rounds of clarifications and revisions, moving swiftly to a decision.

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You'll find a handy one-page PDF on how to respond to reviewers' comments here:

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To support the continuity of the peer review process, we recommend returning your manuscript to us within 14 days. If you think you will need additional time, please let us know and we will aim to respond within 48 hours.

Kind regards,

Luca Modenese
Editorial Board Member
Scientific Reports

Reviewer Comments:

Reviewer 2

The edits to the paper do improve the content and mostly address the critiques. The additions to the figures in particular improve the understanding of the paper's content. Changes made to the manuscript also improve the understanding of the methodology, specifically by the comparison to the prior paper by Gao. The addition of the limitations section also appropriately addresses most of the limitations of the study.

There are still many grammatical errors which lead to some difficulty understanding the study. It would be beneficial for the paper to have a thorough edit by a native English speaker to identify and correct the grammatical errors.

Additionally, the paper itself is still of limited scope, only addressing one implant design under quasi static loading. The authors justify the use of quasi static rather than dynamic loading by referencing Paul et al. and examining specific points in the gait cycle. The use of quasi static loading could be considered by some to be a limitation of the study.

The authors also still have not conducted sensitivity studies to evaluate how potential inaccuracies in the estimate of model inputs (such as material properties) influence model predictions and the conclusions made from analysis of these predictions. The authors should note that a mesh convergence study is not a form of sensitivity analysis. Rather, mesh convergence is a part of the model verification process.

Specific critiques:

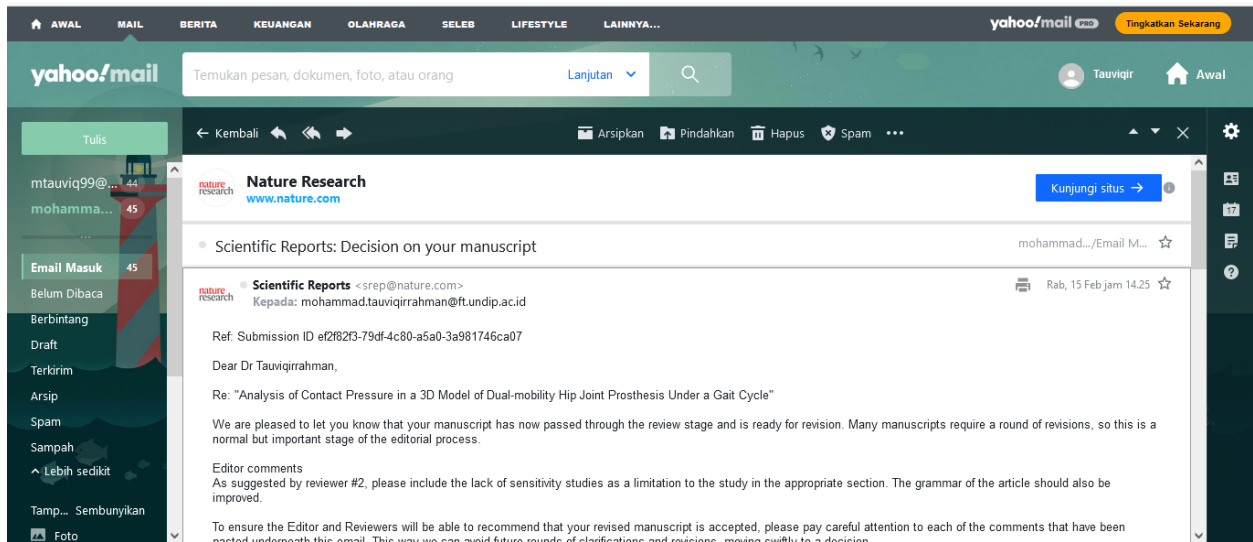
Section from line 203 to 209 would be better placed in the discussion.

Sentence of line 228-229; "Maximum contact pressure generated from the inner liner, outer liner, and acetabular cup showed a lower value on every variation applied." Every variation compared to what?

Reviewer 1

Although also the authors underlined that the paper does "not have any truly significant novelty", the authors tried to timely answer all the questions arisen during the first round of review. I think the paper has been enhanced in quality and presentation.

4. Decision on your manuscript for third review – (15 February 2023)



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Kind regards,

Luca Modenese
Editorial Board Member
Scientific Reports

Reviewer Comments:

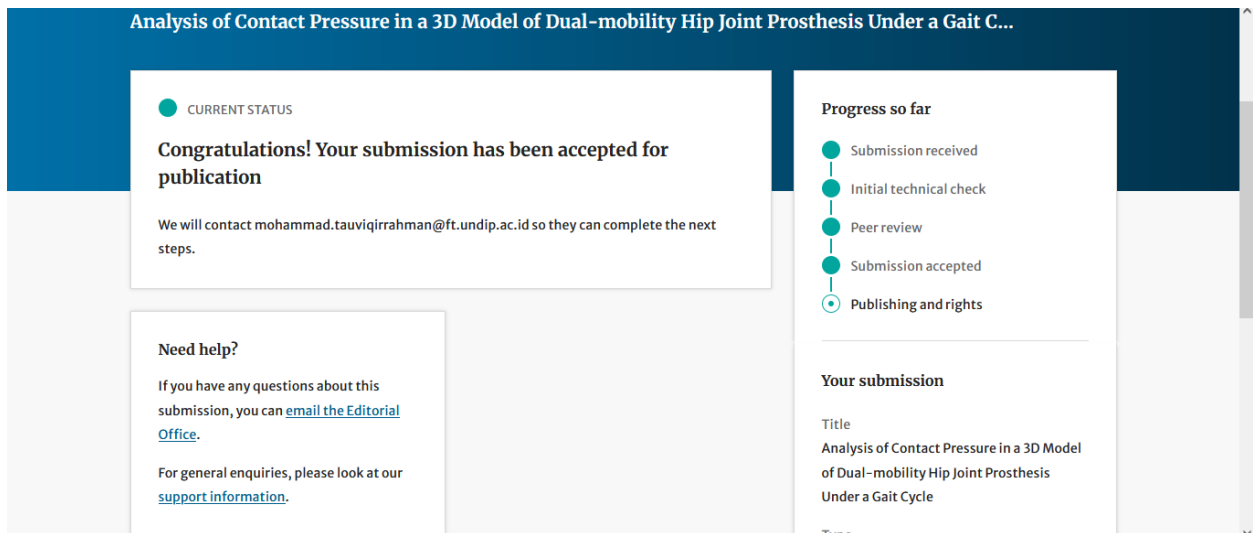
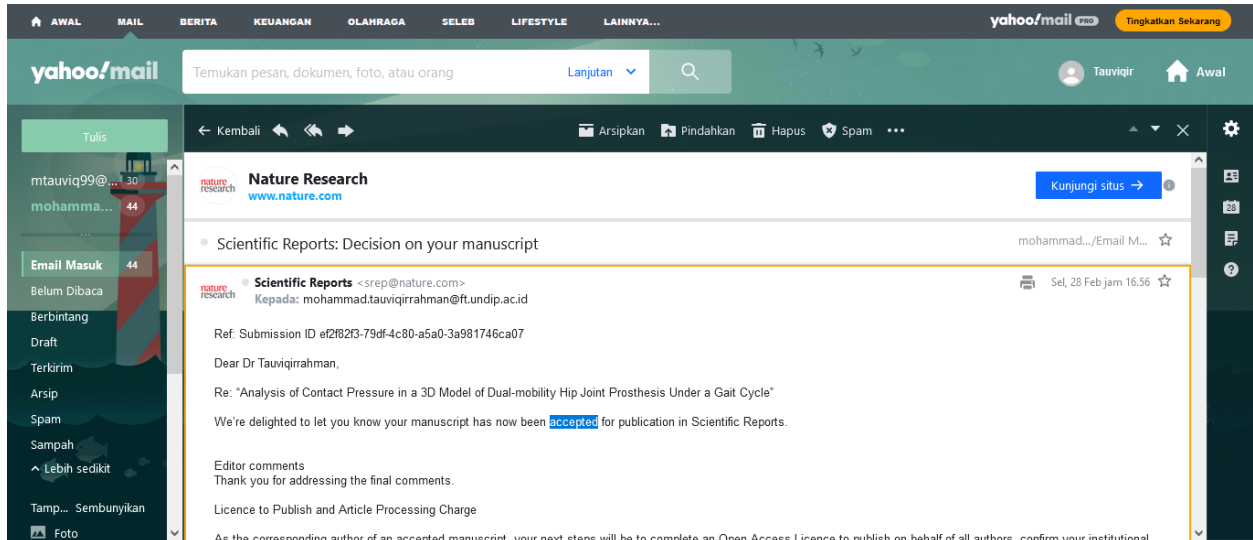
Reviewer 2

Thank you for considering my comments.

I might suggest that the authors make note of the lack of sensitivity studies as a limitation to the study, but I will leave it up to the editor to decide on that.

The grammar could still be improved, but I will leave it up to the Editor to determine whether this is a requirement of publication.

5. Accepted – Selasa, 28 Februari 2023



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Dear Dr Tauviqirrahman,

Re: “Analysis of Contact Pressure in a 3D Model of Dual-mobility Hip Joint Prosthesis Under a Gait Cycle”

We’re delighted to let you know your manuscript has now been accepted for publication in Scientific Reports.

Editor comments
Thank you for addressing the final comments.

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