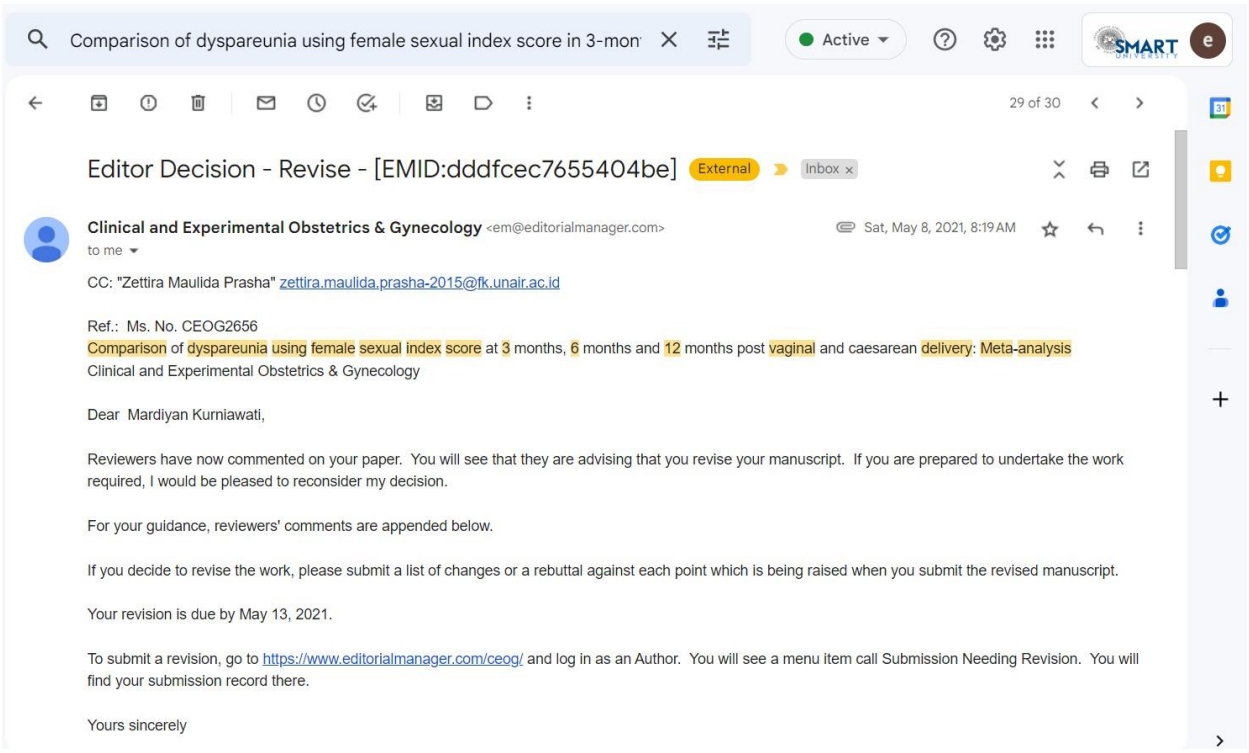
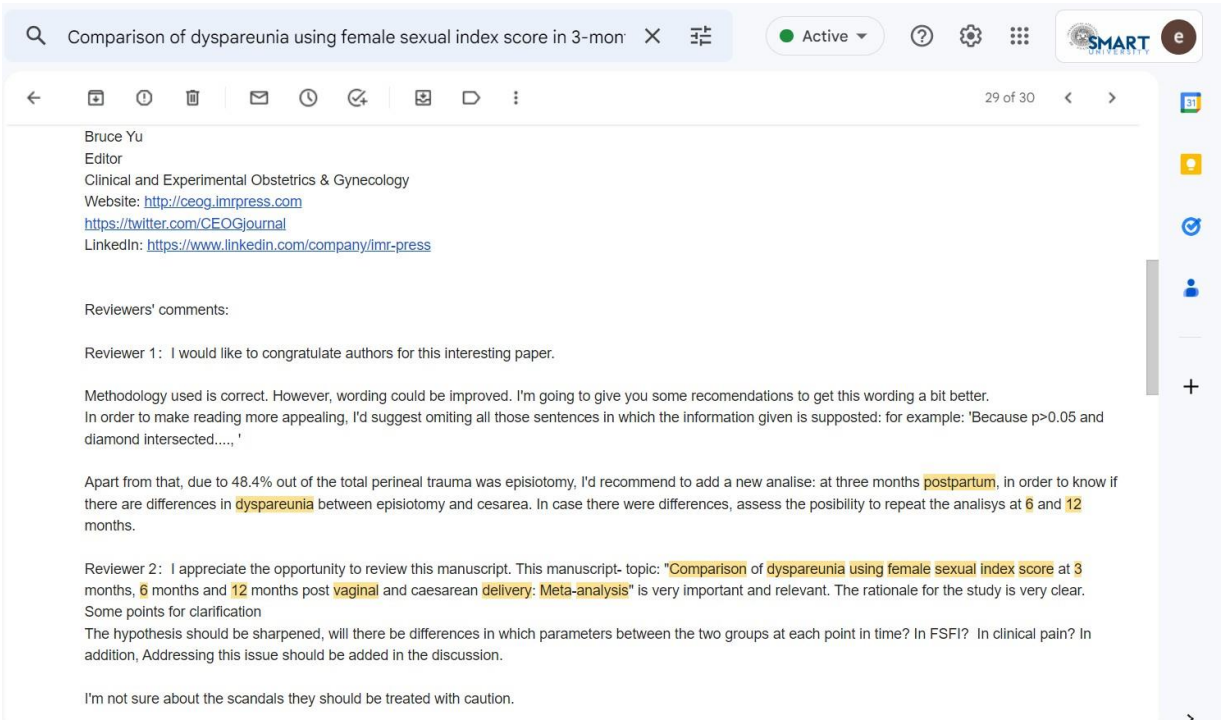

Comparison of dyspareunia using female sexual index score in 3-mon
Active
29 of 30
Editor Decision - Revise - [EMID:dddfcec7655404be]
External
Inbox
Clinical and Experimental Obstetrics & Gynecology <em@editorialmanager.com>
Sat, May 8, 2021, 8:19 AM
to me
CC: "Zettira Maulida Prasha" zettira.maulida.prasha-2015@fk.unair.ac.id
Ref.: Ms. No. CEOG2656
Comparison of dyspareunia using female sexual index score at 3 months, 6 months and 12 months post vaginal and caesarean delivery: Meta-analysis
Clinical and Experimental Obstetrics & Gynecology
Dear Mardiyan Kurniawati,
Reviewers have now commented on your paper. You will see that they are advising that you revise your manuscript. If you are prepared to undertake the work required, I would be pleased to reconsider my decision.
For your guidance, reviewers' comments are appended below.
If you decide to revise the work, please submit a list of changes or a rebuttal against each point which is being raised when you submit the revised manuscript.
Your revision is due by May 13, 2021.
To submit a revision, go to https://www.editorialmanager.com/ceog/ and log in as an Author. You will see a menu item call Submission Needing Revision. You will find your submission record there.
Yours sincerely


Comparison of dyspareunia using female sexual index score in 3-mon
Active
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Bruce Yu
Editor
Clinical and Experimental Obstetrics & Gynecology
Website: http://ceog.imrpress.com
https://twitter.com/CEOGjournal
LinkedIn: https://www.linkedin.com/company/imr-press
Reviewers' comments:
Reviewer 1: I would like to congratulate authors for this interesting paper.
Methodology used is correct. However, wording could be improved. I'm going to give you some recomendations to get this wording a bit better.
In order to make reading more appealing, I'd suggest omiting all those sentences in which the information given is supposted: for example: 'Because p>0.05 and diamond intersected...., '
Apart from that, due to 48.4% out of the total perineal trauma was episiotomy, I'd recommend to add a new analise: at three months postpartum, in order to know if there are differences in dyspareunia between episiotomy and cesarea. In case there were differences, assess the posibility to repeat the analisys at 6 and 12 months.
Reviewer 2: I appreciate the opportunity to review this manuscript. This manuscript- topic: "Comparison of dyspareunia using female sexual index score at 3 months, 6 months and 12 months post vaginal and caesarean delivery: Meta-analysis" is very important and relevant. The rationale for the study is very clear.
Some points for clarification
The hypothesis should be sharpened, will there be differences in which parameters between the two groups at each point in time? In FSFI? In clinical pain? In addition, Addressing this issue should be added in the discussion.
I'm not sure about the scandals they should be treated with caution.

Comparison of dyspareunia using female sexual index score in 3-mon

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Editor's comments:
1.We have now reviewed the text and have concluded that the English language use needs improvement. We understand how difficult this can be, especially if English is not your first language, but for readers to understand and benefit from your work, the use of English must be held to a very high standard.

To help address this issue, we recommend that you have your paper professionally edited for English language by a service such as https://www.ejear.cn/en.
Forward this email to Ejear eDITING to enjoy member discount.
Please note that while this service will greatly improve the readability of your paper, it does not guarantee acceptance of your paper by the journal.
Please return the revised manuscript with a certificate of scientific English editing. All changes should be marked or highlighted in the revised manuscript.

2.A concise and factual abstract is required. The abstract should state briefly the purpose of the research, the principal results and major conclusions. This section should have 250 words, be continuous (not structured).

3.Funding
This research received no external funding
This research was funded by NAME OF FUNDER, grant number XXX

There is additional documentation related to this decision letter. To access the file(s), please click the link below. You may also login to the system and click the 'View Attachments' link in the Action column.
https://www.editorialmanager.com/ceog/l.asp?i=192476&l=5BSB4S5F

In compliance with data protection regulations, you may request that we remove your personal registration details at any time. (Use the following URL: https://www.editorialmanager.com/ceog/login.asp?a=r). Please contact the publication office if you have any questions.

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Comparison of dyspareunia using female sexual index score in 3-mon

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https://www.editorialmanager.com/ceog/l.asp?i=192476&l=5BSB4S5F

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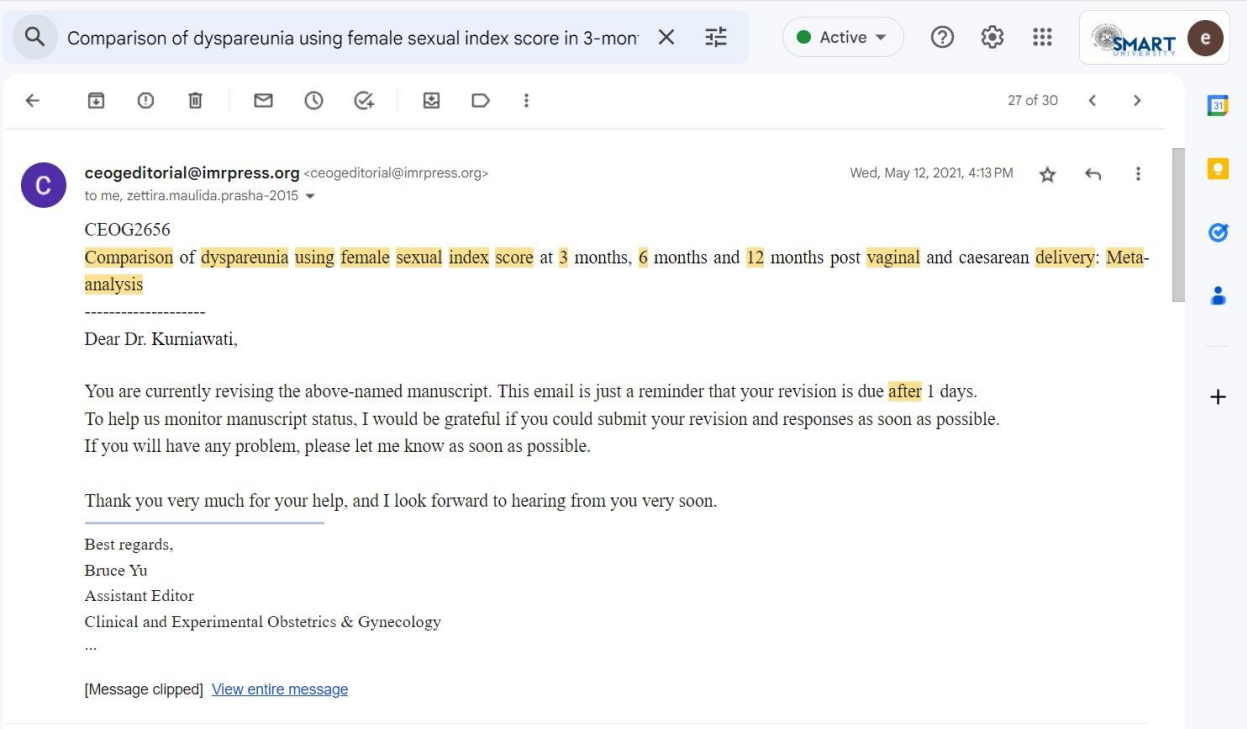
CEOG2656.docx

eighty mardiyan kurniawati <eighty-m-k@fk.unair.ac.id> Sun, May 9, 2021, 11:53 AM
to Clinical

Dear Editor

Thank you for the review regarding the manuscript. We are currently revising this and get back to you soon.

Best regards
Eighty Mardiyan Kurniawati



Comparison of dyspareunia using female sexual index score in 3-mon

Active

27 of 30

ceogeditorial@imrpress.org <ceogeditorial@imrpress.org>
to me, zettira.maulida.prasha-2015

Wed, May 12, 2021, 4:13 PM

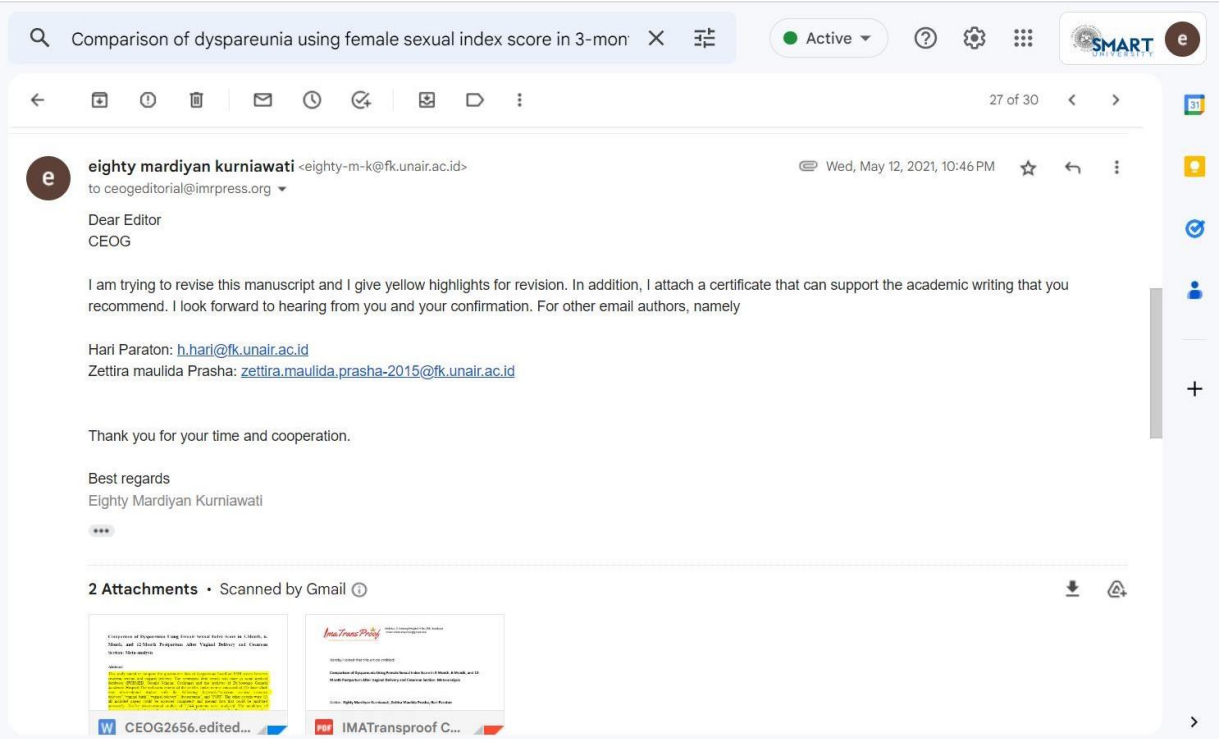
CEOG2656
Comparison of dyspareunia using female sexual index score at 3 months, 6 months and 12 months post vaginal and caesarean delivery: Meta-analysis
---
Dear Dr. Kurniawati,

You are currently revising the above-named manuscript. This email is just a reminder that your revision is due after 1 days.
To help us monitor manuscript status, I would be grateful if you could submit your revision and responses as soon as possible.
If you will have any problem, please let me know as soon as possible.

Thank you very much for your help, and I look forward to hearing from you very soon.

Best regards,
Bruce Yu
Assistant Editor
Clinical and Experimental Obstetrics & Gynecology
...

[Message clipped] View entire message



Comparison of dyspareunia using female sexual index score in 3-mon

Active

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eighty mardiyan kurniawati <eighty-m-k@fk.unair.ac.id>
to ceogeditorial@imrpress.org

Wed, May 12, 2021, 10:46 PM

Dear Editor
CEOG

I am trying to revise this manuscript and I give yellow highlights for revision. In addition, I attach a certificate that can support the academic writing that you recommend. I look forward to hearing from you and your confirmation. For other email authors, namely

Hari Paraton: h.hari@fk.unair.ac.id
Zettira maulida Prasha: zettira.maulida.prasha-2015@fk.unair.ac.id

Thank you for your time and cooperation.

Best regards
Eighty Mardiyan Kurniawati

2 Attachments • Scanned by Gmail

CEOG2656.edited...

IMATransproof C...

Comparison of dyspareunia using female sexual index score in 3-mon

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27 of 30

ceogeditorial@imrpress.org <ceogeditorial@imrpress.org>
to me

Thu, May 13, 2021, 8:16 AM

Dear Dr. Kurniawati,

I have received your revision file, but I noticed that there is no response to reviewers.
The response document is very important and indispensable for the second round review.
Do you forgot to upload it?
If yes, please send it in the mail.
I have attached the response template, you could also fill in it and send to me.

Looking forward to hearing from you soon.

eighty mardiyan kurniawati <eighty-m-k@fk.unair.ac.id>
to ceogeditorial@imrpress.org

Thu, May 13, 2021, 9:23 AM

Dear editor

I apologize. I haven't marked the comments I added for reviewers. Regarding the response template, I have not found it in my email. I received only the manuscript file. Would you like to send which sections I need to complete ? Thank you in advance.

Best regards,
Eighty Mardiyan Kurniawati

Comparison of dyspareunia using female sexual index score in 3-mon

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27 of 30

ceogeditorial@imrpress.org <ceogeditorial@imrpress.org>
to me

Thu, May 13, 2021, 10:16 AM

Dear Dr. Kurniawati,

I'm sorry maybe I didn't succeed attaching it just now.
I have attached it again, please check it.

Looking forward to hearing from you.

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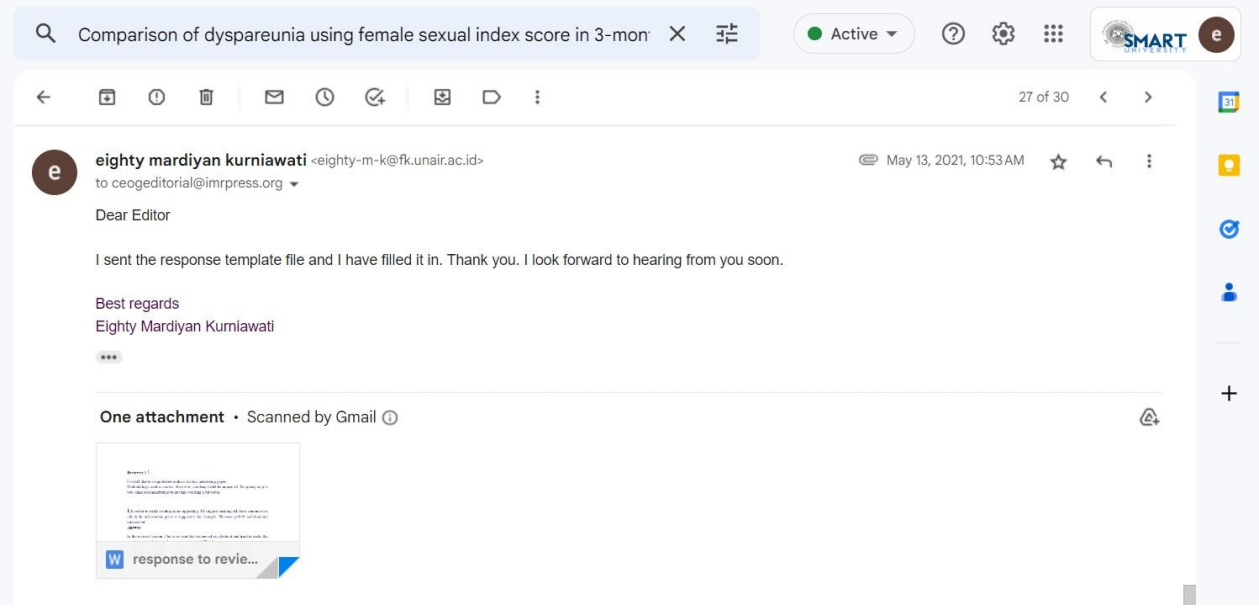
response to revie...

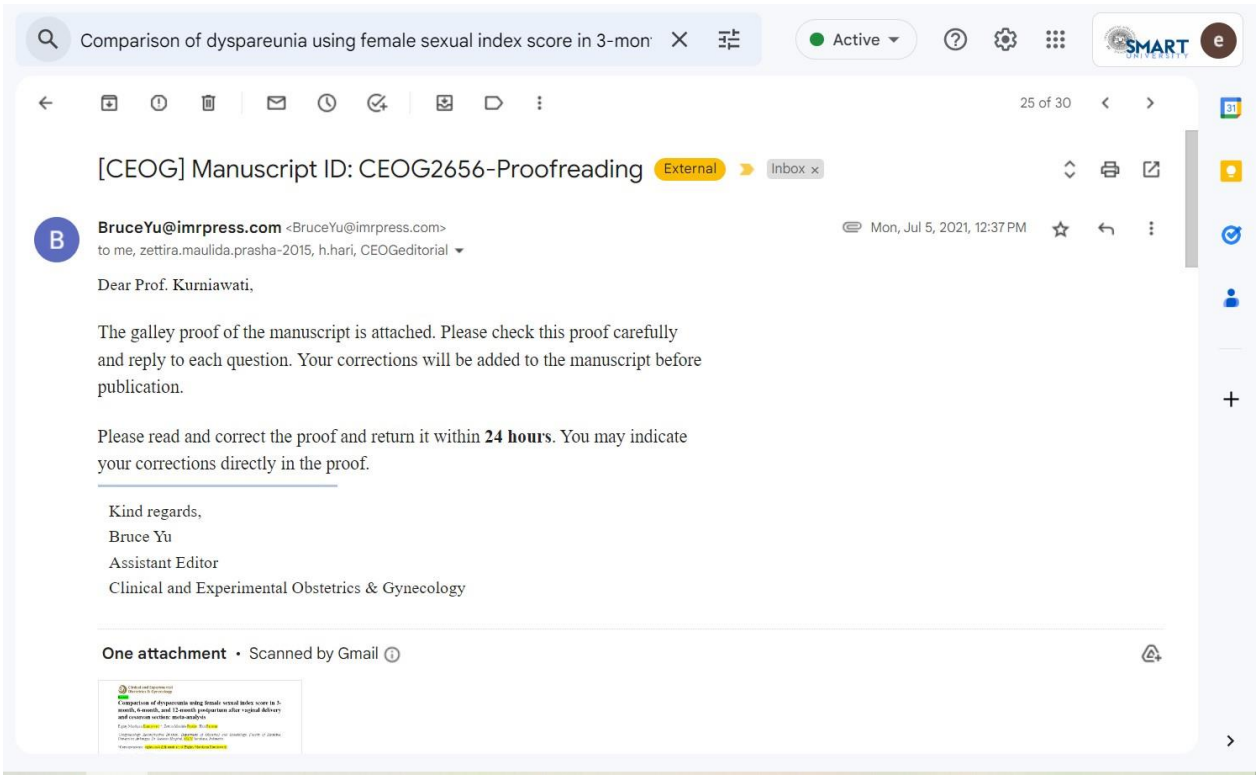


ceogeditorial@imrpress.org <ceogeditorial@imrpress.org> May 13, 2021, 1:37 PM
to me

Dear Dr. Kurniawati,

I have receive the reponse file, and your manuscript is under the second round review.
If there is any news about your manuscript, I will contact you in time

Reply Forward


Comparison of dyspareunia using female sexual index score in 3-mon
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[CEOG] Manuscript ID: CEOG2656-Proofreading
External
Inbox ×
BruceYu@imrpress.com <BruceYu@imrpress.com>
to me, zettira.maulida.prasha-2015, h.hari, CEOGeditorial
Mon, Jul 5, 2021, 12:37 PM
Dear Prof. Kurniawati,
The galley proof of the manuscript is attached. Please check this proof carefully and reply to each question. Your corrections will be added to the manuscript before publication.
Please read and correct the proof and return it within 24 hours. You may indicate your corrections directly in the proof.
Kind regards,
Bruce Yu
Assistant Editor
Clinical and Experimental Obstetrics & Gynecology
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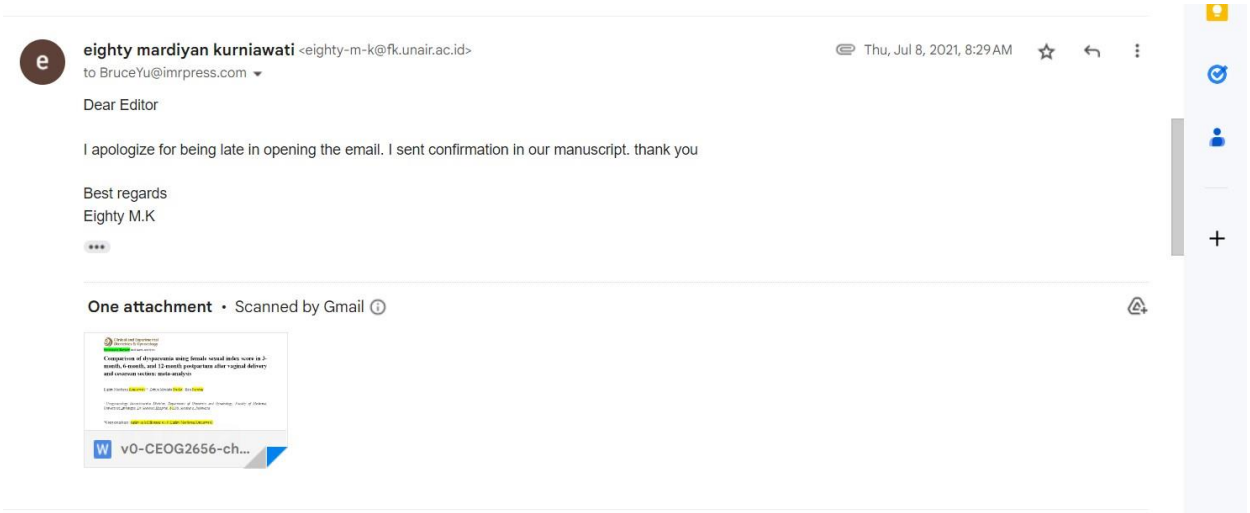

eighty mardiyan kurniawati <eighty-m-k@fk.unair.ac.id>
to BruceYu@imrpress.com
Thu, Jul 8, 2021, 8:29 AM
Dear Editor
I apologize for being late in opening the email. I sent confirmation in our manuscript. thank you
Best regards
Eighty M.K
One attachment • Scanned by Gmail
v0-CEOG2656-ch...

BruceYu@imrpress.com <BruceYu@imrpress.com> Jul 8, 2021, 9:00 AM

to ceogeditorial, me

Dear Prof. Kurniawati,

Thank you for your reply.
I am sorry for thr uncleae expression.
That question means you need to point out where the data analysis related to fig 2 appears.
Could you please tell us which section/paragraph of the data analysis in the article is figure 2?
In 3. results or 3.1 Meta-analysis of 3-month postpartum?

For pictures, is your picture from the instrument/Software or yourself?
Can you provide clearer pictures to make your article more attractive?

Thank you very much for your cooperation.

eighty mardiyan kurniawati <eighty-m-k@fk.unair.ac.id> Jul 8, 2021, 10:28 AM

to BruceYu@imrpress.com

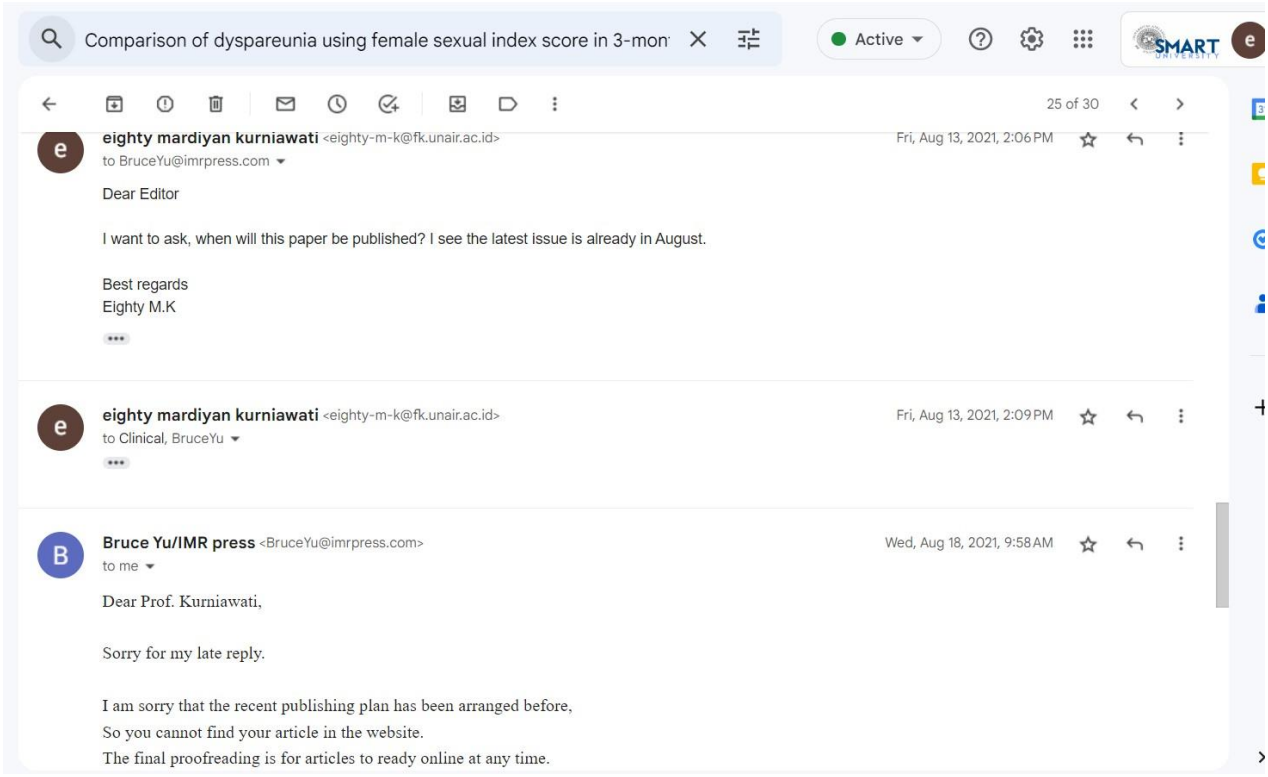
Dear Editor

We apologize for this problem and add the sentence below.

Assessment of study quality using the ROBINS-I. This rating is different from the assessment in the Randomized Controlled Trial study.
There are 7 criteria for bias in this table, which consist of bias due to confounding, bias due to selection of participants, bias in classification of interventions, bias due to deviations from intended interventions, bias due to missing data, bias in measurement of outcomes, bias in selection of the reported results. From fig 2, it can be concluded that in all studies who are included have a high risk of bias. High bias occurs on the confounding domain because most studies found the confounders that can cause dyspareunia as well, such as breastfeeding conditions and history of dyspareunia before delivery. High bias also occurs in the domain selection of participants, because in studies that included, participants were divided after the intervention was carried out. On the domain measurement of outcomes also has a high bias, because the outcome assessor already knows the group of participants, between the intervention and control. It is said to be low risk if blinding is done, so that the outcome assessor do not know each participant's group

We get this data from the instrument/software. I also apologize for the picture we only have of this.

Best regards
Eighty M.K



Comparison of dyspareunia using female sexual index score in 3-mon

Active

25 of 30

eighty mardiyan kurniawati <eighty-m-k@fk.unair.ac.id>
to BruceYu@imrpress.com
Fri, Aug 13, 2021, 2:06 PM

Dear Editor

I want to ask, when will this paper be published? I see the latest issue is already in August.

Best regards
Eighty M.K

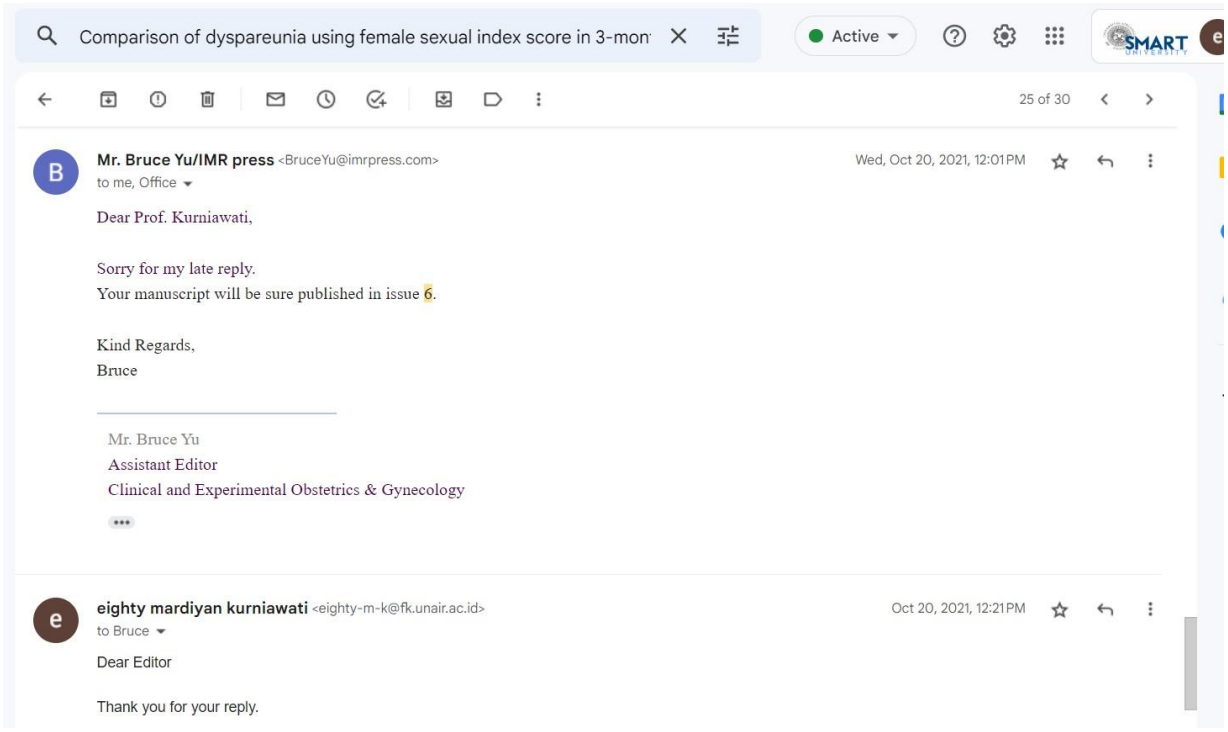
eighty mardiyan kurniawati <eighty-m-k@fk.unair.ac.id>
to Clinical, BruceYu
Fri, Aug 13, 2021, 2:09 PM

Bruce Yu/IMR press <BruceYu@imrpress.com>
to me
Wed, Aug 18, 2021, 9:58 AM

Dear Prof. Kurniawati,

Sorry for my late reply.

I am sorry that the recent publishing plan has been arranged before,
So you cannot find your article in the website.
The final proofreading is for articles to ready online at any time.



Comparison of dyspareunia using female sexual index score in 3-mon

Active

25 of 30

Mr. Bruce Yu/IMR press <BruceYu@imrpress.com>
to me, Office
Wed, Oct 20, 2021, 12:01 PM

Dear Prof. Kurniawati,

Sorry for my late reply.
Your manuscript will be sure published in issue 6.

Kind Regards,
Bruce

Mr. Bruce Yu
Assistant Editor
Clinical and Experimental Obstetrics & Gynecology

eighty mardiyan kurniawati <eighty-m-k@fk.unair.ac.id>
to Bruce
Oct 20, 2021, 12:21 PM

Dear Editor

Thank you for your reply.

History for Manuscript Number: CEOG2656

Close

Correspondence History

Correspondence Date	Letter	Recipient	Revision
May 31, 2021	Editor Decision - Accept	Eighty Mardiyan Kurniawati, Ph.D	1
May 12, 2021	Author Submits Revision Confirmation	Eighty Mardiyan Kurniawati, Ph.D	1
May 12, 2021	PDF Built and Requires Approval	Eighty Mardiyan Kurniawati, Ph.D	1
May 07, 2021	Editor Decision - Revise	Eighty Mardiyan Kurniawati, Ph.D	0
Apr 18, 2021	Author Submits New Manuscript Confirmation	Eighty Mardiyan Kurniawati, Ph.D	0
Apr 18, 2021	Author Notice of Manuscript Number	Eighty Mardiyan Kurniawati, Ph.D	0
Apr 18, 2021	PDF Built and Requires Approval	Eighty Mardiyan Kurniawati, Ph.D	0
Apr 18, 2021	PDF Built and Requires Approval	Eighty Mardiyan Kurniawati, Ph.D	0

Close

Reviewer 1:

I would like to congratulate authors for this interesting paper.
Methodology used is correct. However, wording could be improved. I'm going to give you some recomendations to get this wording a bit better.

1.In order to make reading more appealing, I'd suggest omiting all those sentences in which the information given is supposted: for example: 'Because p>0.05 and diamond intersected...., '
Answer:

In the revised version, I have revised that section of my abstract and tried to make the word structure better and easier to understand. Thank you.

2.Apart from that, due to 48.4% out of the total perineal trauma was episiotomy, I'd recommend to add a new analise: at three months postpartum, in order to know if there are differences in dyspareunia between episiotomy and cesarea. In case there were differences, assess the posibility to repeat the analisys at 6 and 12 months.

Answer:

I apologize for not understanding your point. In this manuscript in normal delivery we make one part of 'normal delivery' whether an episiotomy is performed or an episiotomy is not performed due to data limitations.

Reviewer 2:

I appreciate the opportunity to review this manuscript. This manuscript- topic: "Comparison of dyspareunia using female sexual index score at 3 months, 6 months and 12 months post vaginal and caesarean delivery: Meta-analysis" is very important and relevant. The rationale for the study is very clear.
Some points for clarification

1.The hypothesis should be sharpened, will there be differences in which parameters between the two groups at each point in time? In FSFI? In clinical pain? In addition, Addressing this issue should be added in the discussion.
I'm not sure about the scandals they should be treated with caution.

Answer:

We are trying to edit our hypothesis, I apologize, is there anything we need to clarify again?

Our hypothesis :

There are differences in dyspareunia rates after 3-month cesarean and vaginal delivery according to female sexual function index scores (FSFI).

There are differences in dyspareunia rates after 6-month cesarean and vaginal delivery according to female sexual function index scores (FSFI).

There are differences in dyspareunia rates after 12-month cesarean and vaginal delivery according to female sexual function index scores (FSFI).

Comparison of Dyspareunia Using Female Sexual Index Score in 3-Month, 6-Month, and 12-Month Postpartum After Vaginal Delivery and Cesarean Section: Meta-analysis

Abstract

This study aimed to compare the quantitative data of dyspareunia based on FSFI scores between cesarean section and vaginal delivery. The systematic data search was done in some medical databases (PUBMED, Google Scholar, Cochrane) and the archives of Dr.Soetomo General Academic Hospital.The inclusion criteria of the articles under review consisted of (1) those which were observational studies with the following keywords "cesarean section","cesarean delivery","vaginal birth","vaginal delivery","dyspareunia", and "FSFI". The other criteria were (2) all included papers could be accessed completely and present data that could be analyzed accurately. Twelve observational studies of 2,144 patients were analyzed. The incidence of dyspareunia in postpartum mothers was not significantly different at 3 months after cesarean section and vaginal delivery (MD = 0.18; 95% CI = -0.19-0.54; p = 0.35), 6 months after cesarean section and vaginal delivery (MD = 0.43; 95% CI = -0.28-1.14; p = 0.23) and 12 months after cesarean section and vaginal delivery (MD = 0.12; 95% CI = -0 , 23-0.48; p = 0.50). The three studies are heterogeneous because I^2 is more than 50%. There was a tendency for lower dyspareunia rate to occur after 3 months, 6 months, and 12 months of postpartum after cesarean section than vaginal delivery although it did not differ significantly.

Keywords: cesarean section, cesarean delivery, vaginal birth, vaginal delivery, dyspareunia, FSFI

Introduction

In recent years, the number of cesarean bithshas increased worldwide. Approximately 30% of births in 2015 were cesarean births, which were almost three times the number of cesarean births in 1980, which was at 11% (Boerma, 2018). This figure is significantly above the WHO recommendation rate at 15-20% (WHO, 2015). In the US, for instance, the number of cesarean births in 2015 reached 32% of total births, of which 2.5% were cesarean delivery bymothers' request (ACOG, 2018). The birth rate in Italy was 33.7%, which makes Italy have the highest cesarean delivery rate in Europe (Masciullo, 2020).

The delivery process is associated with the incidence of postpartum dyspareunia. Dyspareunia is a genital pain disorder that adversely affects a woman's quality of life. This disorder occurs with a high prevalence and imposes a significant financial burden on women and the health care system (Sorensen, 2018). McDonald's cohort study (2015) stated that women who gave birth at 6 months through cesarean birth had fewer risk factors for dyspareunia than women who gave birth normally with an intact perineum (OR = 0.76). However, in 18-month postpartum, women with elective cesarean section had a greater risk factor for dyspareunia than women who delivered normally with an intact perineum (OR = 1.71) (McDonald, 2015). Mindset about delivery methods has changed due to the changing roles of women. Nowadays, women have greater autonomy rights and are career-oriented, and even some experience late marriages (Kaur, 2019). In addition to the revolutionized mindset, cesarean sectionis perceived to reduce the risk of pelvic floor injuries and maintain good sexual function (Souza, 2013). Therefore,it is considered a viable option even without medical indications or just bymothers' request known as Cesarean Section on Maternal Request (CSMR) (Masciullo, 2020). However, the research concluded that postpartum dyspareunia could still occur even though a woman underwent cesarean section.

Blomquist found women who experienced forceps delivery and those who gave birth to babies weighing more than 4 kgoften experienced dyspareunia more (Blomquist, 2014). Both Blomquist's and McDonald's research supports each other (Mc Donald, 2015). Constrastingly, Fauconnier's research on 1-year postpartum women stated that childbirth with tools treated episiotomy, and perineal trauma did not increase the risk of postpartum dyspareunia (Fauconnier, 2011). It goes the same way with Irwanto's research at Dr. SoetomoDistrict General Hospital in Indonesia, showing no significant difference in the female sexual function index scores in patients with cesarean section and vaginal delivery (Irwanto, 2016). This proves that even after vaginal delivery, the sexual function remains good.

Manresa conducted a meta-analysis study on dyspareuniato examine the incidence of perineal pain and dyspareunia after vaginal delivery. The study showed that women who underwent an episiotomy experienced moreincidence of perineal pain and dyspareunia (Manresa, 2019). The

second meta-analysis study conducted by Yang compared postpartum pelvic floor function after cesarean section to vaginal delivery. His research concluded that cesarean delivery could preferably maintain the pelvic floor function (Yang, 2019). Another meta-analysis study by Fan in Chinadiscovered no difference in sexual satisfaction among women after cesarean section and vaginal delivery; another finding showedthat there was a difference in the time to initiate postpartum intercourse after cesarean section and vaginal delivery (Fan, 2017).

The issues aforementioned were further investigated in the current research. Itaimed to comparethe dyspareunia rate according to female sexual function index scoresafter mothers had cesarean delivery and vaginal deliverywith various postpartum periods of 3 months, 6 months, and 12 months. Putting the variety of period could provide conclusive quantitative results through meta-analysis. This study could benefit healthcare providers to provide earlier detection of dyspareunia after mothers have undergone cesarean birth and vaginal delivery. Moreover, it becomes a educational reference for women about various childbirth problems such asdyspareunia.

Hypothesis: There are differences in dyspareunia rates after 3-month, 6-month, and 12-month cesarean and vaginal delivery according to female sexual function index scores (FSFI).

Methods

The meta-analysis study was conducted following the Preferred Reporting Items for Systematic reviews and Meta-analyzes (PRISMA) guide and the Cochrane Handbook for Systematic Reviews of Interventions. Articles under review were searched on some journal databases such as PubMed, Google Scholar, and the Cochrane Central Register of Controlled Trials. Articles selected should be randomized control trials and observational studies comparing dyspareunia ratesafter cesarean section and vaginal delivery according to female sexual function index (FSFI) scores. Journal article search was done using a combination of several terms, namely "Cesarean section", "Vaginal delivery", "Dyspareunia", and "FSFI". The research was conducted through some stages which were keyword determination/PICO identification, literature search based on PRISMA flowchart, literature analysis, statistical analysis, discussion, and conclusion. PICO identification in this study stood for Population (primiparous women), Intervention (elective cesarean section), Comparison (vaginal delivery, intact perineum, gr I-II perineal rupture, small episiotomy), and Outcome (dyspareunia after 3 months, 6 months, 12 months of postpartum after cesarean section and vaginal delivery). This meta-analysis study only involved case-control and cohort studies that examined dyspareunia ratesafter cesarean sectionand vaginal delivery according to the FSFI scores. The articles included should have examinedprimiparous patients who ever delivered normally with an intact perineum, grade I-II perineal rupture, or small episiotomy, as well as patients who ever

undergoneselective caesarean section. Besides, the articles should cover research conducted to patients after 3 months, 6 months, 12 months of postpartum after their labor. All included articles were completely accessible and had data that could be analyzed accurately. However, some exclusion criteria applied tostudies involving multiparous patients, patients with complicated vaginal delivery, gr III, or gr IV perineal ruptureand assistive devices such as vacuum or forceps, patients with emergency cesarean section, and the absence of assessment of dyspareunia using FSFI.

Assessment of study quality

The study quality assessment was carried out by the researchers independently. The validity of each study was assessed based on the criteria listed in the Cochrane Handbook for Systematic Reviews of Interventions. Discussion among the researchers was required when differences of opinionemerged. All of the studieswere grouped and assessed according to the quality categories:having a low risk of bias, a medium risk of bias, a high risk of bias. Data extraction was performed to achieve the goals and objectives, as well as to answer the research questions.

Statistical analysis

The clinical outcome analyzed was dyspareunia according to the FSFI scores in nominal data presented inMean Difference and Standard Deviation. The statistical analysis presenteddata extraction, effect size, homogeneity test, homogeneous fixed effect model or heterogeneous random effect model, summary effect, and forest plot. The combined statistical analysis and effect size meta-analysis were analyzed using the Review Manager (RevMan) software version 5.3. Then, the combined mean and Standard Deviation (SD) as well as 95% confidence intervals of the respective literature were calculated before the results were reported in identical scales. The heterogeneity between studies was assessed from the values of p and I2. P-value greater than 0.05 indicatesthe combined research was homogeneous. I2-valueequal to 0 suggests no variation was found in the combined research, and I^2 less than 50% means the combined research was homogeneous. When the data were homogeneous, analysis was carried out using a fixed-effect model. The opposite type of data was then analyzed using a random-effects model. Publication bias was further scrutinized using a funnel plot, which is an algorithm to assess the plot symmetry through plot ranking correlation and analysis.

Results

From the search on Pubmed, Google Scholar, and the Cochrane Central Register of Controlled Trials, 1,051 titles and abstracts were identified. Only one article that met the inclusion

criteria was available in the library of Dr. Soetomo General Academic Hospital in Indonesia. Not all of them went through analysis since there were 230 duplicate articles. After that, abstract screening was performed and resulted in 71 articles with the same PICO. The full-text articleswere checked to assess the quality of the study. A total of 4 articles were inaccessible, and 55 articles were unselected as they did not meet the inclusion critera. The excluded articles had questionnaires which did not use FSFI and werenot conducted in series of postpartum period. Moreover, theirdata did not meet the eligibility. Consequently, 12 articles met the inclusion criteria and were proceeded in the meta-analysis. Figure 1 shows the research flows starting fromm identification, inclusion, and exclusion, literature search, and reasons for exclusion.

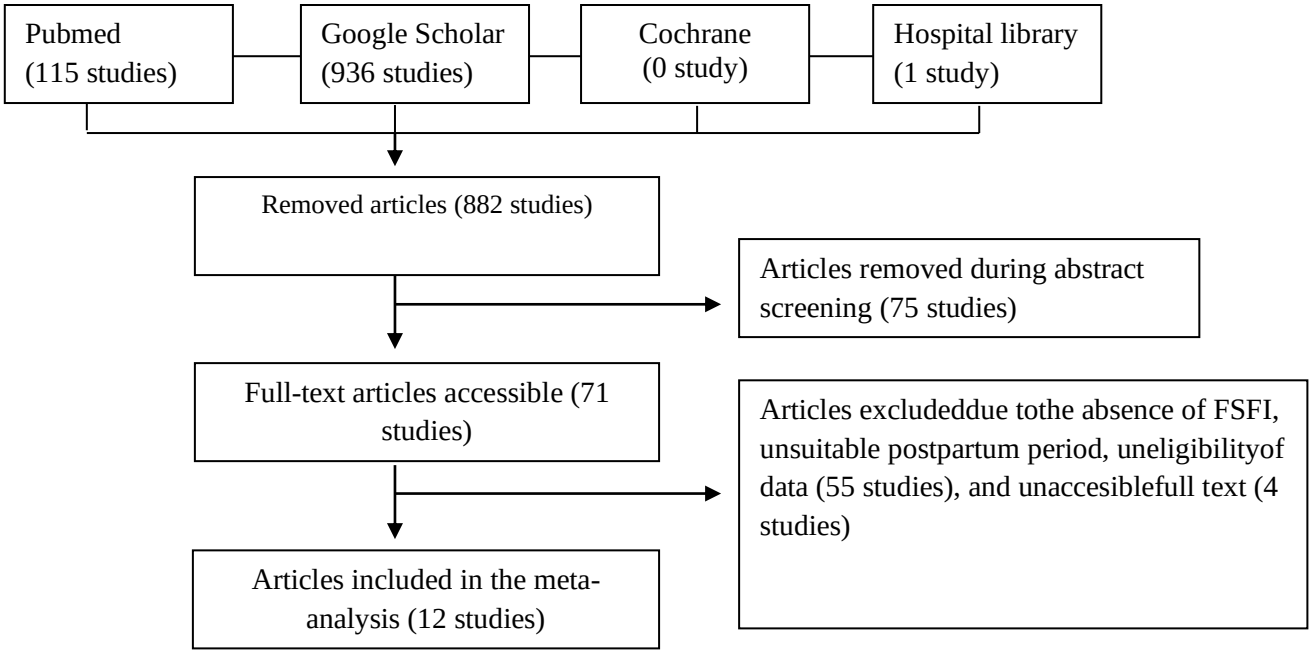


Figure 1. Flowchart of the article selection process

Characteristics of studies involvedare presented in Table 1, which contains the author's name, year of publication, research location, sample size, study design, intervention, and postpartum period. Articles were published in 2006 to 2019. The smallest sample size was 31 participants, and the largest was 450 participants. Overall, 1,029 women were identified to be in the cesarean section group, and 1,115 women were categorized asthe vaginal delivery group. The Risk of Bias In Non-randomized Studies-of Interventions (ROBINS-I) was employed to assess each study quality. The research assessment was different from that for Randomized Controlled Trial studysince it examined seven bias criteria due to confounding, selection of participants, classification of interventions, deviations from intended interventions, missing data, the measurement of outcomes, and the selection of the reported result. The assessment summarized that all the included studies had

a high risk of bias. High bias occuredin the confounding domain because most studies had confounderssuch as breastfeeding conditions and a history of dyspareunia prior to deliverythat could cause dyspareunia as well. High bias also occuredduring the selection of participantsas the the participants were grouped after the intervention. Besides, the measurement of outcomes might also be the reason for a high bias since the rater already knew the participantsin the intervention and control groups. Normally, a low bias might appear whenthe selection of participants is carried out blindly.

Table 1.Researchcharacteristics

Study	Year	Country	Study Design	Intervention	Sample Size (PA/PV)	Postpartum Period
Dabiri	2014	Iran	Cross-Sectional	Episiotomy with elective cesarean section	150 (69/81)	3,6
Lurie	2013	Israel	Cohort	Episiotomy with elective cesarean section	31 (17/14)	3,6
Irwanto S	2016	Indonesia	Cross-Sectional	Mediolateral episiotomy with elective cesarean section	60 (30/30)	3
Irwanto Y	2019	Indonesia	Cross-Sectional	Mediolateral episiotomy with elective cesarean section	90 (45/45)	3
Baksu	2006	Turki	Cohort	Mediolateral episiotomy with elective cesarean section	248 (92/132)	6
Barbara	2015	Italia	Cohort	Vaginal delivery (intact perineum, perineal laceration, episiotomy, and elective cesarean section)	224 (92/132)	6
Sayed	2017	Mesir	Cross-Sectional	Vaginal delivery (intact perineum, perineal laceration, episiotomy, and elective cesarean section)	277 (137/140)	6
Alesheikh	2016	Iran	Cross-Sectional	Vaginal delivery (intact perineum, perineal laceration, episiotomy, and elective cesarean section)	450 (225/225)	6
Saydam	2017	Turki	Cross-Sectional	Vaginal delivery (intact perineum, perineal laceration, episiotomy, and cesarean section)	142 (77/65)	6,12
Moghadam	2019	Iran	Cohort	Mediolateral episiotomy with elective cesarean section	107 (58/49)	6,12
Eid	2015	Mesir	Cohort	Episiotomy with elective cesarean section	200 (110/90)	3
Cai	2013	China	Case-Control	Episiotomy with elective cesarean section	165 (77/88)	12

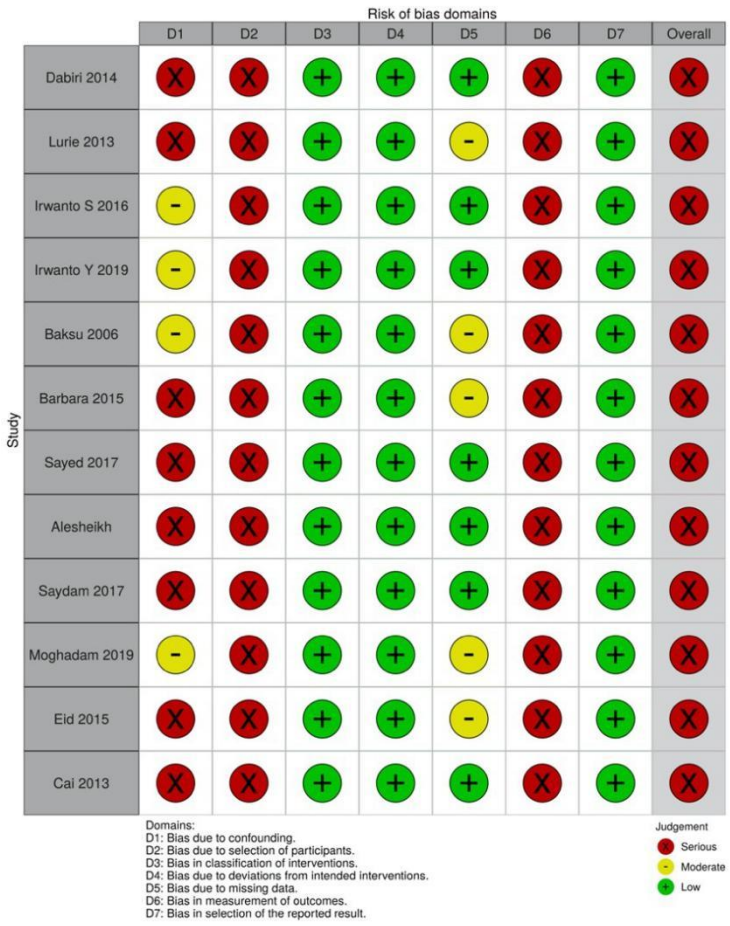


Figure 2. Bias risk assessment ofincluded studiesusingthe ROBINS-I assessment tool

Meta-analysis of 3-Month Postpartum

Five studies involved 531 samples (271 samples in the cesarean delivery group and 260 samples in the vaginal delivery group) (Figure 3). The results showed a I2-value of 62%indicates that the studies were heterogenous, and thus the random-effects model was used for analysis. The diamond intersected the confidence interval line and indicated that there was no statistically significant difference in dyspareunia rates after3 months of postpartum after cesarean delivery and vaginal delivery (MD = 0.18; 95%CI = -0.19-0.54; p = 0.35).

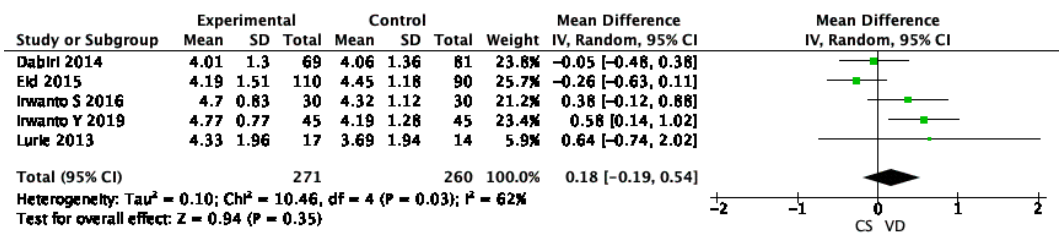


Figure 3. Forest plot of dyspareunia in 3-month postpartumaccording to FSFI scores.

Notes: SD: standard deviation; IV: inverse variance; CI: confidence interval; df: degrees of freedom

Meta-analysis of 6-Month Postpartum

Eight studies hada total of 1,548 samples (790 samples in the cesarean delivery group and 758 samples in the vaginal delivery group) (Figure 4). AI2 valueof 97% indicatedthat the studies were heterogenous and thus analyzed using the random-effects model. The study showed the diamond intersected the confidence interval line. There was no statistically significant difference in the dyspareunia rate in 6-monthpostpartum after cesarean delivery and vaginal delivery (MD = 0.43; 95%CI =-0.28-1.14; p = 0.23).

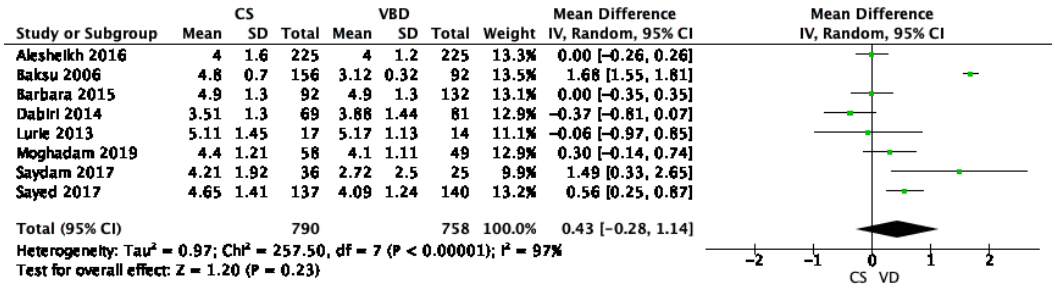


Figure 4. Forest plot of dyspareunia in 6-month postpartum according to FSFI scores.

Notes: SD: standard deviation; IV: inverse variance; CI: confidence interval; df: degrees of freedom

Meta-analysis of 12-Month Postpartum

Three studies reviewed possessed353 samples (176 samples in the cesarean delivery group and 177 samples in the vaginal delivery group) (see Fig. 5). AI2-value of 51% indicatedthat heterogeneity was found between the studies, and thusthe random-effects model was employed for analysis.The result demonstrated the diamond intersected the confidence interval line, and there was no statistically significant difference in dyspareunia ratesin 12-month postpartum after cesarean sectionand vaginal delivery(MD = 0.12; 95%CI =-0.23-0.4; p = 0.50).

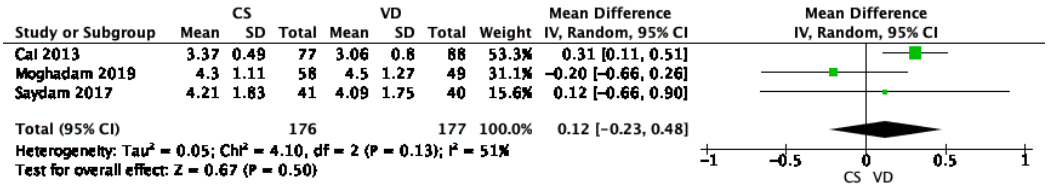


Figure 5.Forest plot of dyspareunia in 3-month postpartum according to FSFI scores.

Notes: SD: standard deviation; IV: inverse variance; CI: confidence interval; df: degrees of freedom

In the forest plot, the dyspareunia score in 6-month postpartum showed high heterogeneity with 97%I2. However, the studies obtained the same quality or weight (see Figure 5), and thus a sensitivity analysis was not performed.

Publication bias

In each 3-month, 6-month, and 12-month postpartum, there were only 5 studies, 8 studies, and 3 studies. The funnel plot ofdyspareunia in 3-month postpartum showed a fairly symmetrical picture, where there waslittle possibility of publication bias (Figure 6). While,in 6-month postpartum, it showed an asymmetrical picture, suggesting publication bias (Figure 7). Similar to the picture in 3-month postpartum, the funnel plot ofdyspareunia in 12-month postpartum was fairly symmetrical (Figure 8).

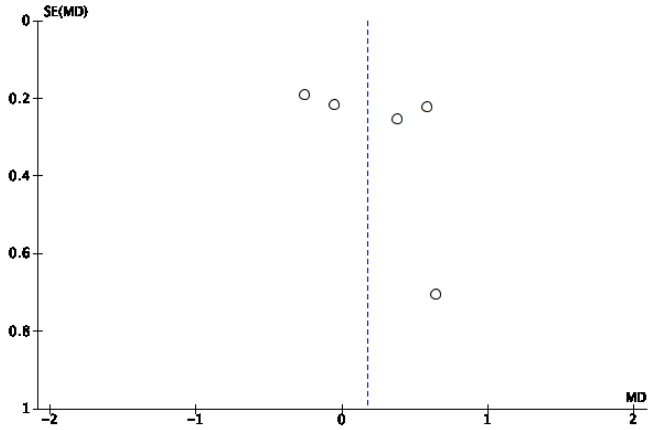


Figure 6. Funnel plot of dyspareunia in 3-month postpartumaccording to FSFI score.

Notes: SE:standard error; MD: mean difference

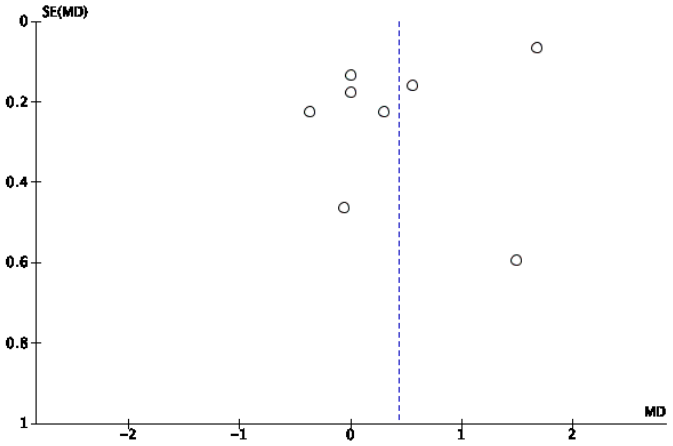


Figure 7. Funnel plot of dyspareunia in 6-month postpartum according to FSFI score.

Notes: SE:standard error; MD: mean difference

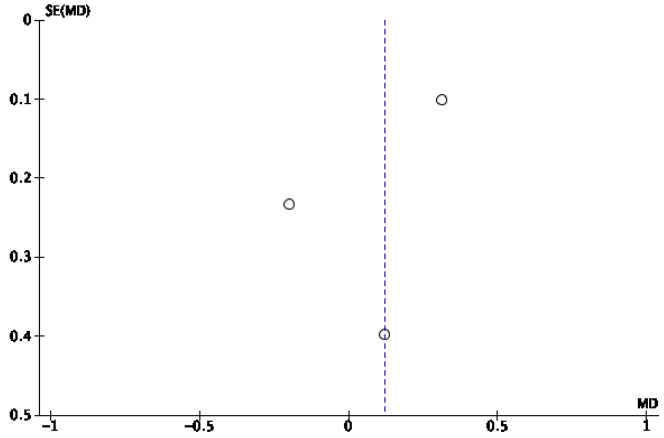


Figure 8. Funnel plot of dyspareunia in 12-month postpartum according to FSFI score.

Notes: SE:standard error; MD: mean difference

Discussion

The forest plot scores for dyspareunia in3-month postpartum highlighted that the diamond tilted more to the right, proving that the FSFI score was higher in cesarean section (MD = 0.18; 95%CI = 0.19-0.54; p = 0.35; I2 = 62%). In other words, casarean section could pose lower dyspareunia. However, the difference was not statistically significant in 3-month postpartum after cesarean section and vaginal delivery. The forest plot of dyspareunia rates in 6 months of postpartum illustrated that the diamond tilted more to the right, proving that the FSFI score was higher or lower dyspareunia was foundin cesarean section. The diamond intersected the vertical line, and there was no statistically significant difference in dyspareunia ratesin 6-month postpartum after cesarean section and vaginal (MD = 0.43; 95%CI = -0.28-1.14; p = 0.25; I2 = 97%). The heterogeneity between the studies was very

highat 97% due to different numbers of samples with the largest sample sizeof 450 samples in Alesheikh's study and the smallest of 31 samplesin Lurie's study. Besides, it can occur due to different patient characteristics, such as a socio-economic factor, age range, and level of education, as well as confounding factors including the absence of data on the type of episiotomy and skin incision in cesarean section. A research conducted by Alligood-Percoco NR, et al (2016) stated that as many as 21.2% of women reported dyspareunia at 6 months postpartum.

The forest plot of dyspareunia ratesin12 months of postpartum demonstrated that the diamond tilted more to the right. It means higher FSFI score in cesarean section indicated lower dyspareunia. However, there was no statistically significant difference in dyspareunia rates in 12-month postpartum after cesarean sectionand vaginal delivery (MD = 0.12; 95%CI = -0.23-0.48; p = 0.5; I2 = 51%). From the overall forest plots in different postpartum periods, it was summarized that there wasno significant difference between cesarean section and vaginal delivery. A similar study by Fan in China examined differences in postpartum sexual function aftercesarean section and vaginal delivery. The results found no difference in sexual satisfaction of women in 3 months and 6 months of postpartum (Fan, 2017).

Regarding the diamond leaning to the right, it was evident that the dyspareunia rate was higher in vaginal delivery than in cesarean section. The meta-analysis by Manresa reported that mothers undergoing vaginal delivery with an intact perineum could still experience dyspareunia, higher especially in women who went through perineal tear or episiotomy during labor (Manresa, 2019).

Even in elective cesarean section, there are still complaints of dyspareuniadue to breastfeeding factors, fatigue factors, or stress factors. A study on6-month postpartum concluded that among breastfeeding women (OR = 2.89;95%CI = 2.33-3.59), women who were exhausted (OR 1.60, 95% CI 1.30-1.98) and were in stressful conditions (OR 1.55, 95% CI 1.18-2.02) had a higher risk of dyspareunia (Alligood-Percoco, 2016). Besides,women with a surgical wound defect (niche) with adhesions after having caserean section were at risk of dyspareunia. A systematic review study in 2014 revealed that 18% of women with surgical wound defects (niche) complained of dyspareunia (Bij de Vaate AJ, et al 2014).

Cesarean sectioncould maintain the function of the woman's pelvic floor. A meta-analysis comparing cesarean sectionand vaginal delivery reported that pelvic floor muscle strength, vaginal muscle tension, and maximum urinary flow rate after cesarean sectionwere better than vaginal delivery (Yang, 2019). Although maternal characteristics at birth such as age or Body Mass Index (BMI) increase the risk of pelvic floor dysfunction pregnancy and delivery factors affect the pelvic floor anatomy and function (Urbankova, 2019).

A cesarean section, despite being performed electively, still carries a high risk of complications. A previous meta-analysis study showed that women who underwentcesarean delivery had a higher risk of death (OR = 3.10) and postpartum infection (OR = 2.83) (Mascarello, 2016). Other studies have shown that cesarean delivery poseda higher risk of hysterectomy (OR = 1.30), obstetric shock (OR = 2.54), and anesthetic complications (OR = 2.18) (Farchi, 2010). Obstetric shock includes bleeding shock, pulmonary embolism, amniotic fluid embolism, and sepsis (Habek, 2008).

From the above discussion, distinguished postpartum periodsin the research were aimed at reducing the time factor as a confounder. However, there werestill some limitations in this study. First, the results might be influenced by many other confounding variables, such as the absence of data on the type of episiotomy in several studies andtype of abdominal incision in cesarean section, breastfeeding status, and a history of previous dyspareunia. As a result, the data obtained had high heterogeneity. Second, this current study implied a fairly high bias because the selection of the subjects was not done blindly. The future research could use randomized controlled trials design with a blind subject selection to reduce the research bias.

Conclusion

In all 3 months, 6 months, and 12 months of postpartum, the dyspareunia rate was likelylower in cesarean section although the difference was not statistically significant. Further meta-analysis studies need to evaluate other indicators compared between cesarean sectionand vaginal delivery. More studies, especially RCTs, can be included for possible further meta-analyses. It is important to inform pregnant women that vaginal delivery is not a major contributing factorto sexual dysfunction. Importantly, cesarean section should only be undertaken when there are medical indications for both mother and the fetus.

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Clinical and Experimental Obstetrics & Gynecology

Review

Comparison of dyspareunia using female sexual index score in 3-month, 6-month, and 12-month postpartum after vaginal delivery and cesarean section: meta-analysis

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Abstract

Background: The cesarean delivery rate has been increasing all over the world over the last few years. There is a change in mindset due to the change in women'srole, let alone the perception stating that cesarean delivery can decrease the risk ofhaving pelvic floor dysfunction and maintain the sexual functions. Therefore, women think that cesarean delivery is a good choice for delivery, even it has no indications. This study aimed at analyzing and providing quantitative data by comparing the dyspareunia based on FSFI scores between cesarean section and vaginal delivery. *Method*: The systematic data search was done in the Medical Database (PUBMED,*Google Scholar, Cochrane*) and the archives of RSUD Dr. Soetomo. The inclusioncriteria consisted of (1) observational study with the following keywords *"cesarean section"*, *"cesarean delivery"*, *"vaginal birth"*, *"vaginal delivery"*, *"dyspareunia"*, *"FSFI"*, (2) all included papers could be accessed completely, and the data that had been obtained could be analyzed accurately. *Result*: Twelve observational studies toward 2144 patients had been analyzed. The dyspareunia score after 3-month of delivery between cesarean section and vaginal delivery had a *Mean Difference* (MD) of 0.18 and 95% CI of –0.19 to 0.54(*P*-value of 0.35). The dyspareunia score after 6-month of delivery between cesarean section and vaginal delivery had a *Mean Difference* (MD) of 0.43 and 95%CI of –0.28 to 1.14 (*P*-value of 0.23). Meanwhile, the dyspareunia score after 12-month of delivery between cesarean section and vaginal delivery had a *Mean Difference* (MD) of 0.12 and 95% CI of –0.23 to 0.48 (*P*-value of 0.50). From thosethree forest plots, all diamonds were tangent to the vertical line *(no effect)* and hada $P > 0.05$, so it could be inferred that no significant statistical difference was foundbetween the experimental group (cesarean section) and the control group (vaginal delivery). Those three studies were heterogeneous since I^2 was more than 50%. *Conclusion*: This meta-analysis concludes that there is a tendency for 3-month, 6-month, and 12-month of post delivery dypareunia rate to be lower in cesarean section than vaginal delivery, but it's not staistically significant.

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Keywords:

Cesarean section; Cesarean delivery; Vaginal birth; Vaginal delivery; Dyspareunia; FSFI

1. Introduction

In recent years, the number of cesarean bithshas increased worldwide. Approximately 30% of births in 2015 were cesarean births, which were almost three times the number of cesarean births in 1980, which was at 11% [1]. This figure is significantly above the WHO recommendation rate at 15–20% [2]. In the US, for instance, the number of cesarean births in 2015 reached 32% of total births, of which 2.5% were cesarean delivery bymothers' request [3]. The birth rate in Italy was 33.7%, which makes Italy have the highest cesarean delivery rate in Europe [4].

The delivery process is associated with the incidence of postpartum dyspareunia. Dyspareunia is a genital pain disorder that adversely affects a woman's quality of life. This disorder occurs with a high prevalence and imposes a significant financial burden on women and the health care system [5]. McDonald's cohort study [6] stated that women who gave birth at 6 months through cesarean birth had fewer risk factors for dyspareunia than women who gave birth normally with an intact perineum (OR = 0.76). However, in 18-month postpartum, women with elective cesarean section had a greater risk factor for dyspareunia than women who delivered normally with an intact perineum (OR = 1.71) [6]. Mindset about delivery methods has changed due to the changing roles of women. Nowadays, women have greater autonomy rights and are career-oriented, and even some experience late marriages [7]. In addition to the revolutionized mindset, cesarean sectionis perceived to reduce the risk of pelvic floor injuries and maintain good sexual function [8]. Therefore, it is considered a viable option even without medical indications or just bymothers' request known as Cesarean Section on Maternal Request (CSMR) [4]. However, the research concluded that postpartum dyspareunia could still occur even though a woman underwent cesarean section.

Blomquist found women who experienced forceps delivery and those who gave birth to babies weighing more than 4 kgoften experienced dyspareunia more [9]. Both Blomquist's and McDonald's research supports each other [6]. Constrastingly, Fauconnier's research on 1-year postpartum women stated that childbirth with tools treated episiotomy, and perineal trauma did not increase the risk of postpartum dyspareunia [10]. It goes the same way with Irwanto's research at Dr. SoetomoDistrict General Hospital in Indonesia, showing no significant difference in the female sexual function index scores in patients with cesarean section and vaginal delivery [11]. This proves that even after vaginal delivery, the sexual function remains good.

Manresa conducted a meta-analysis study on dyspareuniato examine the incidence of perineal pain and dyspareunia after vaginal delivery. The study showed that women who underwent an episiotomy experienced moreincidence of perineal pain and dyspareunia [12]. The second meta-analysis study conducted by Yang compared postpartum pelvic floor function after cesarean section to vaginal delivery. His research concluded that cesarean delivery could preferably maintain the pelvic floor function [13]. Another meta-analysis study by Fan in Chinadiscovered no difference in sexual satisfaction among women after cesarean section and vaginal delivery; another finding showedthat there was a difference in the time to initiate postpartum intercourse after cesarean section and vaginal delivery [14].

The issues aforementioned were further investigated in the current research. Itaimed to comparethe dyspareunia rate according to female sexual function index scoresafter mothers had cesarean delivery and vaginal deliverywith various postpartum periods of 3-month, 6-month, and 12-month. Putting the variety of period could provide conclusive quantitative results through meta-analysis. This study could benefit healthcare providers to provide earlier detection of dyspareunia after mothers have undergone cesarean birth and vaginal delivery. Moreover, it becomes a educational reference for women about various childbirth problems such asdyspareunia.

2. Methods

The meta-analysis study was conducted following the Preferred Reporting Items for Systematic reviews and Meta-analyzes (PRISMA) guide and the Cochrane Handbook for Systematic Reviews of Interventions. Articles under review were searched on some journal databases such as PubMed, Google Scholar, and the Cochrane Central Register of Controlled Trials. Articles selected should be randomized control trials and observational studies comparing dyspareunia ratesafter cesarean section and vaginal delivery according to female sexual function index (FSFI) scores. Journal article search was done using a combination of several terms, namely "Cesarean section",

"Vaginal delivery", "Dyspareunia", and "FSFI". The research was conducted through some stages which were keyword determination/PICO identification, literature search based on PRISMA flowchart, literature analysis, statistical analysis, discussion, and conclusion. PICO identification in this study stood for Population (primiparous women), Intervention (elective cesarean section), Comparison (vaginal delivery, intact perineum, gr I-II perineal rupture, small episiotomy), and Outcome (dyspareunia after 3-month, 6-month, 12-month of postpartum after cesarean section and vaginal delivery). This meta-analysis study only involved case-control and cohort studies that examined dyspareunia ratesafter cesarean sectionand vaginal delivery according to the FSFI scores. The articles included should have examinedprimiparous patients who ever delivered normally with an intact perineum, grade I-II perineal rupture, or small episiotomy, as well as patients who ever undergoneselective caesarean section. Besides, the articles should cover research conducted to patients after 3- month, 6-month, 12-month of postpartum after their labor. All included articles were completely accessible and had data that could be analyzed accurately. However, some exclusion criteria applied tostudies involving multiparous patients, patients with complicated vaginal delivery, gr III, or gr IV perineal ruptureand assistive devices such as vacuum or forceps, patients with emergency cesarean section, and the absence of assessment of dyspareunia using FSFI.

Hypothesis: There are differences in dyspareunia rates after 3-month, 6-month, and 12-month cesarean and vaginal delivery according to female sexual function index scores (FSFI).

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2.1 Assessment of study quality

The study quality assessment was carried out by the researchers independently. The validity of each study was assessed based on the criteria listed in the Cochrane Handbook for Systematic Reviews of Interventions. Discussion among the researchers was required when differences of opinionemerged. All of the studieswere grouped and assessed according to the quality categories: having a low risk of bias, a medium risk of bias, a high risk of bias. Data extraction was performed to achieve the goals and objectives, as well as to answer the research questions.

2.2 Statistical analysis

The clinical outcome analyzed was dyspareunia according to the FSFI scores in nominal data presented inMean Difference and Standard Deviation. The statistical analysis presenteddata extraction, effect size, homogeneity test, homogeneous fixed effect model or heterogeneous random effect model, summary effect, and forest plot. The combined statistical analysis and effect size meta-analysis were analyzed using the Review Manager (RevMan) software version 5.3 (Cochrane Inc., London, UK). Then, the combined mean and Standard Deviation (SD) as well as 95% confidence intervals of the respective literature were calculated before the results were reported in identical scales. The heterogeneity between studies was assessed from the values of *P* and I^2. *P*-value greater than 0.05 indicatesthe combined research was homogeneous. I^2-valueequal to 0 suggests no variation was found in the combined research, and I^2 less than 50% means the combined research was homogeneous. When the data were homogeneous, analysis was carried out using a fixed-effect model. The opposite type of data was then analyzed using a random-effects model. Publication bias was further scrutinized using a funnel plot, which is an algorithm to assess the plot symmetry through plot ranking correlation and analysis.

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3. Results

From the search on Pubmed, Google Scholar, and the Cochrane Central Register of Controlled Trials, 1051 titles and abstracts were identified. Only one article that met the inclusion criteria was available in the library of Dr. Soetomo General Academic Hospital in Indonesia. Not all of them went through analysis since there were 230 duplicate articles. After that, abstract screening was performed and resulted in 71 articles with the same PICO. The full-text articleswere checked to assess the quality of the study. A total of 4 articles were inaccessible, and 55 articles were unselected as they did not meet the inclusion critera. The excluded articles had questionnaires which did not use FSFI and werenot conducted in series of postpartum period. Moreover, theirdata did not meet the eligibility. Consequently, 12 articles met the inclusion criteria and were proceeded in the meta-analysis. Fig. 1 shows the research flows starting fromm identification, inclusion, and exclusion, literature search, and reasons for exclusion.

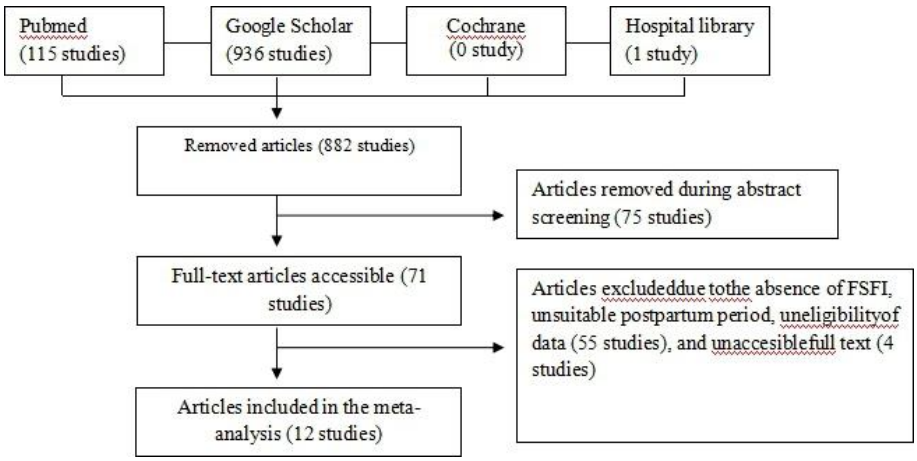

Fig. 1. Flowchart of the article selection process.

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Characteristics of studies involvedare presented in Table 1 (Ref. [11, 15–25]), which contains the author's name, year of publication, research location, sample size, study design, intervention, and postpartum period. Articles were published in 2006 to 2019. The smallest sample size was 31 participants, and the largest was 450 participants. Overall, 1029 women were identified to be in the cesarean section group, and 1115 women were categorized asthe vaginal delivery group. The Risk of Bias In Non-randomized Studies-of Interventions (ROBINS-I) was employed to assess each study quality. The research assessment was different from that for Randomized Controlled Trial studysince it examined seven bias criteria due to confounding, selection of participants, classification of interventions, deviations from intended interventions, missing data, the measurement of outcomes, and the selection of the reported result. The assessment summarized that all the included studies had a high risk of bias. High bias occuredin the confounding domain because most studies had confounderssuch as breastfeeding conditions and a history of dyspareunia prior to deliverythat could cause dyspareunia as well. High bias also occuredduring the selection of participantsas the the participants were grouped after the intervention. Besides, the measurement of outcomes might also be the reason for a high bias since the rater already knew the participantsin the intervention and control groups. Normally, a low bias might appear whenthe selection of participants is carried out blindly.

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Table 1. Researchcharacteristics.

Study	Year	Country	Study design	Intervention	Sample size (PA/PV)	Postpartum period
Dabiri [15]	2014	Iran	Cross-sectional	Episiotomy with elective cesarean section	150 (69/81)	3,6
Lurie [16]	2013	Israel	Cohort	Episiotomy with elective cesarean section	31 (17/14)	3,6
Irwanto S [11]	2016	Indonesia	Cross-sectional	Mediolateral episiotomy with elective cesarean section	60 (30/30)	3
Irwanto Y [17]	2019	Indonesia	Cross-sectional	Mediolateral episiotomy with elective cesarean section	90 (45/45)	3
Baksu [18]	2006	Turki	Cohort	Mediolateral episiotomy with elective cesarean section	248 (92/132)	6
Barbara [19]	2015	Italia	Cohort	Vaginal delivery (intact perineum, perineal laceration, episiotomy, and elective cesarean section)	224 (92/132)	6
Sayed [20]	2017	Mesir	Cross-sectional	Vaginal delivery (intact perineum, perineal laceration, episiotomy, and elective cesarean section)	277 (137/140)	6
Alesheikh [21]	2016	Iran	Cross-sectional	Vaginal delivery (intact perineum, perineal laceration, episiotomy, and elective cesarean section)	450 (225/225)	6
Saydam [22]	2017	Turki	Cross-sectional	Vaginal delivery (intact perineum, perineal laceration, episiotomy, and cesarean section)	142 (77/65)	6,12
Moghadam [23]	2019	Iran	Cohort	Mediolateral episiotomy with elective cesarean section	107 (58/49)	6,12
Eid [24]	2015	Mesir	Cohort	Episiotomy with elective cesarean section	200 (110/90)	3
Cai [25]	2013	China	Case-control	Episiotomy with elective cesarean section	165 (77/88)	12

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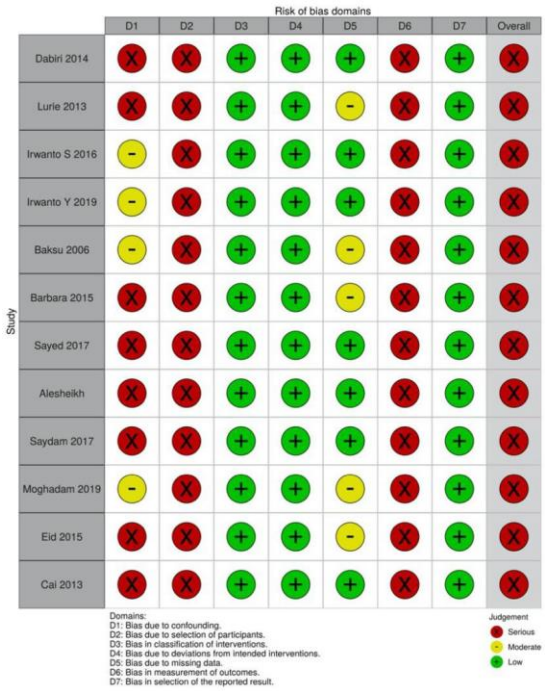

Fig. 2. Bias risk assessment ofincluded studiesusingthe ROBINS-I assessment tool.

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3.1 Meta-analysis of 3-month postpartum

Five studies involved 531 samples (271 samples in the cesarean delivery group and 260 samples in the vaginal delivery group) (Fig. 3). The results showed a I^2-value of 62% indicates that the studies were heterogenous, and thus the random-effects model was used for analysis. The diamond intersected the confidence interval line and indicated that there was no statistically significant difference in dyspareunia rates after 3-month of postpartum after cesarean delivery and vaginal delivery (MD = 0.18; 95% CI = –0.19–0.54; *P* = 0.35).

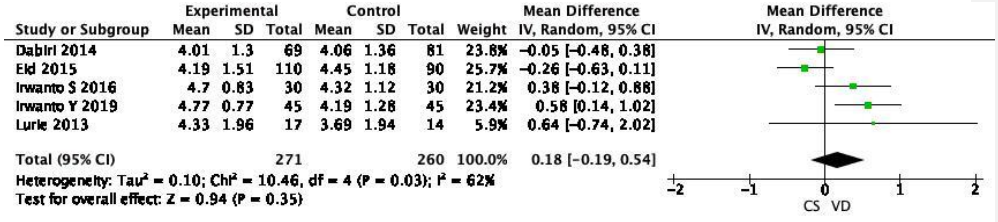

Fig. 3. Forest plot of dyspareunia in 3-month postpartumaccording to FSFI scores.

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Notes: SD, standard deviation; IV, inverse variance; CI, confidence interval; df, degrees of freedom.

3.2 Meta-analysis of 6-month postpartum

Eight studies hada total of 1,548 samples (790 samples in the cesarean delivery group and 758 samples in the vaginal delivery group) (Fig. 4). AI^2 value of 97% indicated that the studies were heterogenous and thus analyzed using the random-effects model. The study showed the diamond intersected the confidence interval line. There was no statistically significant difference in the dyspareunia rate in 6-month postpartum after cesarean delivery and vaginal delivery (MD = 0.43; 95% CI = –0.28–1.14; *P* = 0.23).

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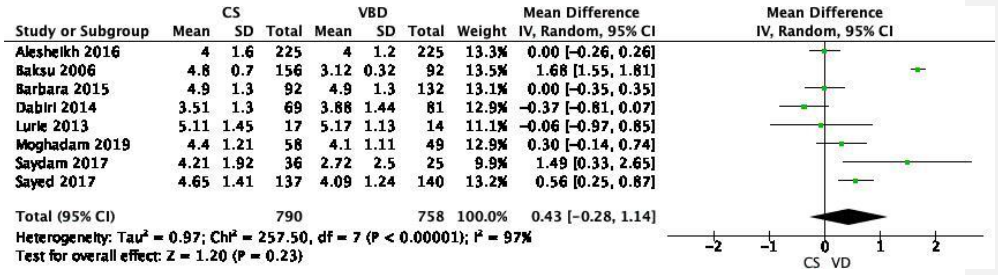

Fig. 4. Forest plot of dyspareunia in 6-month postpartum according to FSFI scores.

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Notes: SD, standard deviation; IV, inverse variance; CI, confidence interval; df, degrees of freedom.

3.3 Meta-analysis of 12-Month Postpartum

Three studies reviewed possessed 353 samples (176 samples in the cesarean delivery group and 177 samples in the vaginal delivery group) (see Fig. 5). AI^2-value of 51% indicatedthat heterogeneity was found between the studies, and thusthe random-effects model was employed for analysis.The result demonstrated the diamond intersected the confidence interval line, and there was no statistically significant difference in dyspareunia ratesin 12-month postpartum after cesarean sectionand vaginal delivery (MD = 0.12; 95% CI = –0.23–0.4; *P* = 0.50).

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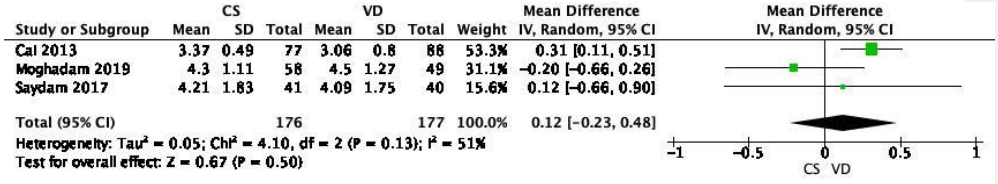

Fig. 5. Forest plot of dyspareunia in 3-month postpartum according to FSFI scores.

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Notes: SD, standard deviation; IV, inverse variance; CI, confidence interval; df, degrees of freedom.

In the forest plot, the dyspareunia score in 6-month postpartum showed high heterogeneity with 97% I^2. However, the studies obtained the same quality or weight (see Fig. 5), and thus a sensitivity analysis was not performed.

3.4 Publication bias

In each 3-month, 6-month, and 12-month postpartum, there were only 5 studies, 8 studies, and 3 studies. The funnel plot ofdyspareunia in 3-month postpartum showed a fairly symmetrical picture, where there waslittle possibility of publication bias (Fig. 6). While, in 6-month postpartum, it showed an asymmetrical picture, suggesting publication bias (Fig. 7). Similar to the picture in 3-month postpartum, the funnel plot ofdyspareunia in 12-month postpartum was fairly symmetrical (Fig. 8).

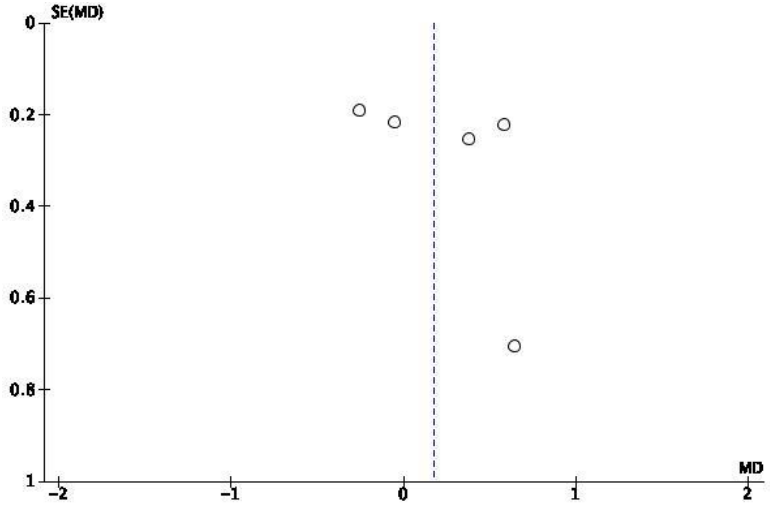

Fig. 6. Funnel plot of dyspareunia in 3-month postpartumaccording to FSFI score.

Notes: SE, standard error; MD, mean difference.

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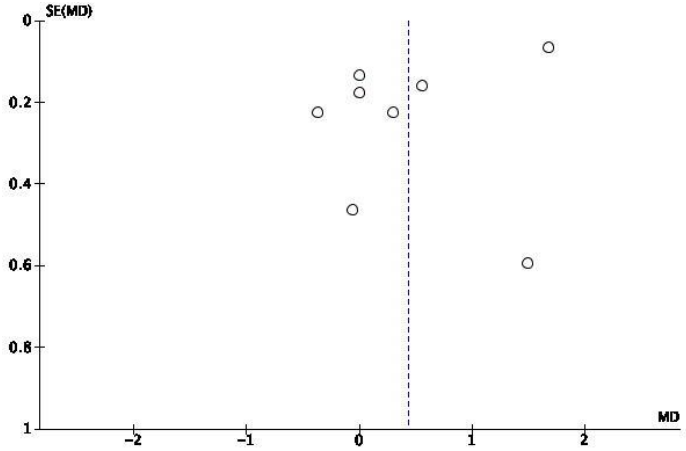

Fig. 7. Funnel plot of dyspareunia in 6-month postpartum according to FSFI score.

Notes: SE, standard error; MD, mean difference.

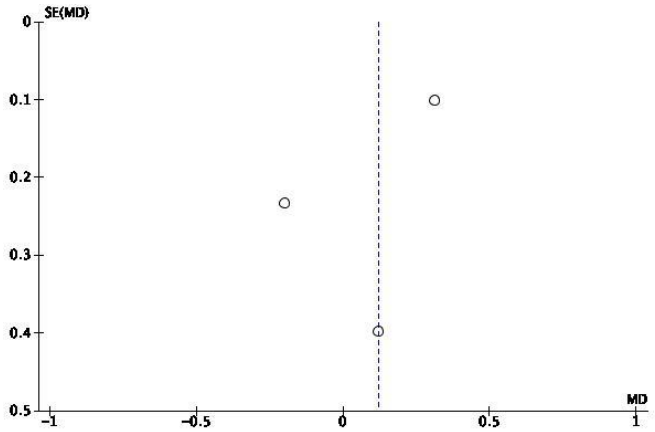

Fig. 8. Funnel plot of dyspareunia in 12-month postpartum according to FSFI score.

Notes: SE, standard error; MD, mean difference.

4. Discussion

The forest plot scores for dyspareunia in3-month postpartum highlighted that the diamond tilted more to the right,

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proving that the FSFI score was higher in cesarean section (MD = 0.18; 95% CI = 0.19–0.54; *P* = 0.35; I^2 = 62%). In other words, casarean section could pose lower dyspareunia. However, the difference was not statistically significant in 3-month postpartum after cesarean section and vaginal delivery. The forest plot of dyspareunia rates in 6-month of postpartum illustrated that the diamond tilted more to the right, proving that the FSFI score was higher or lower dyspareunia was foundin cesarean section. The diamond intersected the vertical line, and there was no statistically significant difference in dyspareunia ratesin 6-month postpartum after cesarean section and vaginal (MD = 0.43; 95% CI = –0.28–1.14; *P* = 0.25; I^2 = 97%). The heterogeneity between the studies was very highat 97% due to different numbers of samples with the largest sample sizeof 450 samples in Alesheikh's study and the smallest of 31 samplesin Lurie's study. Besides, it can occur due to different patient characteristics, such as a socio-economic factor, age range, and level of education, as well as confounding factors including the absence of data on the type of episiotomy and skin incision in cesarean section. A research conducted by Alligood-Percoco NR, *et al*. [26] stated that as many as 21.2% of women reported dyspareunia at 6-month postpartum.

The forest plot of dyspareunia ratesin 12-month of postpartum demonstrated that the diamond tilted more to the right. It means higher FSFI score in cesarean section indicated lower dyspareunia. However, there was no statistically significant difference in dyspareunia rates in 12-month postpartum after cesarean sectionand vaginal delivery (MD = 0.12; 95% CI = –0.23–0.48; *P* = 0.5; I^2 = 51%). From the overall forest plots in different postpartum periods, it was summarized that there wasno significant difference between cesarean section and vaginal delivery. A similar study by Fan in China examined differences in postpartum sexual function aftercesarean section and vaginal delivery. The results found no difference in sexual satisfaction of women in 3-month and 6-month of postpartum [14].

Regarding the diamond leaning to the right, it was evident that the dyspareunia rate was higher in vaginal delivery than in cesarean section. The meta-analysis by Manresa reported that mothers undergoing vaginal delivery with an intact perineum could still experience dyspareunia, higher especially in women who went through perineal tear or episiotomy during labor [12].

Even in elective cesarean section, there are still complaints of dyspareuniadue to breastfeeding factors, fatigue factors, or stress factors. A study on6-month postpartum concluded that among breastfeeding women (OR = 2.89; 95% CI = 2.33–3.59), women who were exhausted (OR 1.60, 95% CI 1.30–1.98) and were in stressful conditions (OR 1.55, 95% CI 1.18–2.02) had a higher risk of dyspareunia [26]. Besides, women with a surgical wound defect (niche) with adhesions after having caserean section were at risk of dyspareunia. A systematic review study in 2014 revealed that 18% of women with surgical wound defects (niche) complained of dyspareunia [27].

Cesarean sectioncould maintain the function of the woman's pelvic floor. A meta-analysis comparing cesarean sectionand vaginal delivery reported that pelvic floor muscle strength, vaginal muscle tension, and maximum urinary flow rate after cesarean sectionwere better than vaginal delivery [13]. Although maternal characteristics at birth such as age or Body Mass Index (BMI) increase the risk of pelvic floor dysfunction pregnancy and delivery factors affect the pelvic floor anatomy and function [28].

A cesarean section, despite being performed electively, still carries a high risk of complications. A previous meta-analysis study showed that women who underwentcesarean delivery had a higher risk of death (OR = 3.10) and postpartum infection (OR = 2.83) (Mascarello, 2016). Other studies have shown that cesarean delivery poseda higher risk of hysterectomy (OR = 1.30), obstetric shock (OR = 2.54), and anesthetic complications (OR = 2.18) [29]. Obstetric shock includes bleeding shock, pulmonary embolism, amniotic fluid embolism, and sepsis [30].

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From the above discussion, distinguished postpartum periodsin the research were aimed at reducing the time factor as a confounder. However, there werestill some limitations in this study. First, the results might be influenced by many other confounding variables, such as the absence of data on the type of episiotomy in several studies andtype of abdominal incision in cesarean section, breastfeeding status, and a history of previous dyspareunia. As a result, the data obtained had high heterogeneity. Second, this current study implied a fairly high bias because the selection of the subjects was not done blindly. The future research could use randomized controlled trials design with a blind subject selection to reduce the research bias.

5. Conclusions

In all 3-month, 6-month, and 12-month of postpartum, the dyspareunia rate was likely lower in cesarean section although the difference was not statistically significant. Further meta-analysis studies need to evaluate other indicators compared between cesarean sectionand vaginal delivery. More studies, especially RCTs, can be included for possible further meta-analyses. It is important to inform pregnant women that vaginal delivery is not a major contributing factorto sexual dysfunction. Importantly, cesarean section should only be undertaken when there are medical indications for both mother and the fetus.

Author contributions

EMK: develop ideas and analysis data, ZMP: collecting and processing data, HP: finishing data and manuscript preparation.

Ethics approval and consent to participate

Not applicable.

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Conflict of interest

The authors declare no conflict of interest.

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Clinical and Experimental Obstetrics & Gynecology

Systematic Review and meta-analysis

Comparison of dyspareunia using female sexual index score in 3-month, 6-month, and 12-month postpartum after vaginal delivery and cesarean section: meta-analysis

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Abstract

Background: The cesarean delivery rate has been increasing all over the world over the last few years. There is a change in mindset due to the change in women'srole, let alone the perception stating that cesarean delivery can decrease the risk ofhaving pelvic floor dysfunction and maintain the sexual functions. Therefore, women think that cesarean delivery is a good choice for delivery, even it has no indications. This study aimed at analyzing and providing quantitative data by comparing the dyspareunia based on FSFI scores between cesarean section and vaginal delivery. *Method*: The systematic data search was done in the Medical Database (PUBMED,*Google Scholar, Cochrane*) and the archives of RSUD Dr. Soetomo. The inclusioncriteria consisted of (1) observational study with the following keywords *"cesarean section"*, *"cesarean delivery"*, *"vaginal birth"*, *"vaginal delivery"*, *"dyspareunia"*, *"FSFI"*, (2) all included papers could be accessed completely, and the data that had been obtained could be analyzed accurately. *Result*: Twelve observational studies toward 2144 patients had been analyzed. The dyspareunia score after 3-month of delivery between cesarean section and vaginal delivery had a *Mean Difference* (MD) of 0.18 and 95% CI of –0.19 to 0.54(*P*-value of 0.35). The dyspareunia score after 6-month of delivery between cesarean section and vaginal delivery had a *Mean Difference* (MD) of 0.43 and 95%CI of –0.28 to 1.14 (*P*-value of 0.23). Meanwhile, the dyspareunia score after 12-month of delivery between cesarean section and vaginal delivery had a *Mean Difference* (MD) of 0.12 and 95% CI of –0.23 to 0.48 (*P*-value of 0.50). From thosethree forest plots, all diamonds were tangent to the vertical line *(no effect)* and hada $P > 0.05$, so it could be inferred that no significant statistical difference was foundbetween the experimental group (cesarean section) and the control group (vaginal delivery). Those three studies were heterogeneous since I^2 was more than 50%. *Conclusion*: This meta-analysis concludes that there is a tendency for 3-month, 6-month, and 12-month of post delivery dypareunia rate to be lower in cesarean section than vaginal delivery, but it's not staistically significant.

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Keywords:

Cesarean section; Cesarean delivery; Vaginal birth; Vaginal delivery; Dyspareunia; FSFI

1. Introduction

In recent years, the number of cesarean bithshas increased worldwide. Approximately 30% of births in 2015 were cesarean births, which were almost three times the number of cesarean births in 1980, which was at 11% [1]. This figure is significantly above the WHO recommendation rate at 15–20% [2]. In the US, for instance, the number of cesarean births in 2015 reached 32% of total births, of which 2.5% were cesarean delivery bymothers' request [3]. The birth rate in Italy was 33.7%, which makes Italy have the highest cesarean delivery rate in Europe [4].

The delivery process is associated with the incidence of postpartum dyspareunia. Dyspareunia is a genital pain disorder that adversely affects a woman's quality of life. This disorder occurs with a high prevalence and imposes a significant financial burden on women and the health care system [5]. McDonald's cohort study [6] stated that women who gave birth at 6 months through cesarean birth had fewer risk factors for dyspareunia than women who gave birth normally with an intact perineum (OR = 0.76). However, in 18-month postpartum, women with elective cesarean section had a greater risk factor for dyspareunia than women who delivered normally with an intact perineum (OR = 1.71) [6]. Mindset about delivery methods has changed due to the changing roles of women. Nowadays, women have greater autonomy rights and are career-oriented, and even some experience late marriages [7]. In addition to the revolutionized mindset, cesarean sectionis perceived to reduce the risk of pelvic floor injuries and maintain good sexual function [8]. Therefore, it is considered a viable option even without medical indications or just bymothers' request known as Cesarean Section on Maternal Request (CSMR) [4]. However, the research concluded that postpartum dyspareunia could still occur even though a woman underwent cesarean section.

Blomquist found women who experienced forceps delivery and those who gave birth to babies weighing more than 4 kgoften experienced dyspareunia more [9]. Both Blomquist's and McDonald's research supports each other [6]. Constrastingly, Fauconnier's research on 1-year postpartum women stated that childbirth with tools treated episiotomy, and perineal trauma did not increase the risk of postpartum dyspareunia [10]. It goes the same way with Irwanto's research at Dr. SoetomoDistrict General Hospital in Indonesia, showing no significant difference in the female sexual function index scores in patients with cesarean section and vaginal delivery [11]. This proves that even after vaginal delivery, the sexual function remains good.

Manresa conducted a meta-analysis study on dyspareuniato examine the incidence of perineal pain and dyspareunia after vaginal delivery. The study showed that women who underwent an episiotomy experienced moreincidence of perineal pain and dyspareunia [12]. The second meta-analysis study conducted by Yang compared postpartum pelvic floor function after cesarean section to vaginal delivery. His research concluded that cesarean delivery could preferably maintain the pelvic floor function [13]. Another meta-analysis study by Fan in Chinadiscovered no difference in sexual satisfaction among women after cesarean section and vaginal delivery; another finding showedthat there was a difference in the time to initiate postpartum intercourse after cesarean section and vaginal delivery [14].

The issues aforementioned were further investigated in the current research. Itaimed to comparethe dyspareunia rate according to female sexual function index scoresafter mothers had cesarean delivery and vaginal deliverywith various postpartum periods of 3-month, 6-month, and 12-month. Putting the variety of period could provide conclusive quantitative results through meta-analysis. This study could benefit healthcare providers to provide earlier detection of dyspareunia after mothers have undergone cesarean birth and vaginal delivery. Moreover, it becomes a educational reference for women about various childbirth problems such asdyspareunia.

2. Methods

The meta-analysis study was conducted following the Preferred Reporting Items for Systematic reviews and Meta-analyzes (PRISMA) guide and the Cochrane Handbook for Systematic Reviews of Interventions. Articles under review were searched on some journal databases such as PubMed, Google Scholar, and the Cochrane Central Register of Controlled Trials. Articles selected should be randomized control trials and observational studies comparing dyspareunia ratesafter cesarean section and vaginal delivery according to female sexual function index (FSFI) scores. Journal article search was done using a combination of several terms, namely "Cesarean section",

"Vaginal delivery", "Dyspareunia", and "FSFI". The research was conducted through some stages which were keyword determination/PICO identification, literature search based on PRISMA flowchart, literature analysis, statistical analysis, discussion, and conclusion. PICO identification in this study stood for Population (primiparous women), Intervention (elective cesarean section), Comparison (vaginal delivery, intact perineum, gr I-II perineal rupture, small episiotomy), and Outcome (dyspareunia after 3-month, 6-month, 12-month of postpartum after cesarean section and vaginal delivery). This meta-analysis study only involved case-control and cohort studies that examined dyspareunia ratesafter cesarean sectionand vaginal delivery according to the FSFI scores. The articles included should have examinedprimiparous patients who ever delivered normally with an intact perineum, grade I-II perineal rupture, or small episiotomy, as well as patients who ever undergoneselective caesarean section. Besides, the articles should cover research conducted to patients after 3- month, 6-month, 12-month of postpartum after their labor. All included articles were completely accessible and had data that could be analyzed accurately. However, some exclusion criteria applied tostudies involving multiparous patients, patients with complicated vaginal delivery, gr III, or gr IV perineal ruptureand assistive devices such as vacuum or forceps, patients with emergency cesarean section, and the absence of assessment of dyspareunia using FSFI.

Hypothesis: There are differences in dyspareunia rates after 3-month, 6-month, and 12-month cesarean and vaginal delivery according to female sexual function index scores (FSFI).

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2.1 Assessment of study quality

The study quality assessment was carried out by the researchers independently. The validity of each study was assessed based on the criteria listed in the Cochrane Handbook for Systematic Reviews of Interventions. Discussion among the researchers was required when differences of opinionemerged. All of the studieswere grouped and assessed according to the quality categories: having a low risk of bias, a medium risk of bias, a high risk of bias. Data extraction was performed to achieve the goals and objectives, as well as to answer the research questions.

2.2 Statistical analysis

The clinical outcome analyzed was dyspareunia according to the FSFI scores in nominal data presented inMean Difference and Standard Deviation. The statistical analysis presenteddata extraction, effect size, homogeneity test, homogeneous fixed effect model or heterogeneous random effect model, summary effect, and forest plot. The combined statistical analysis and effect size meta-analysis were analyzed using the Review Manager (RevMan) software version 5.3 (Cochrane Inc., London, UK). Then, the combined mean and Standard Deviation (SD) as well as 95% confidence intervals of the respective literature were calculated before the results were reported in identical scales. The heterogeneity between studies was assessed from the values of *P* and I^2. *P*-value greater than 0.05 indicatesthe combined research was homogeneous. I^2-valueequal to 0 suggests no variation was found in the combined research, and I^2 less than 50% means the combined research was homogeneous. When the data were homogeneous, analysis was carried out using a fixed-effect model. The opposite type of data was then analyzed using a random-effects model. Publication bias was further scrutinized using a funnel plot, which is an algorithm to assess the plot symmetry through plot ranking correlation and analysis.

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3. Results

From the search on Pubmed, Google Scholar, and the Cochrane Central Register of Controlled Trials, 1051 titles and abstracts were identified. Only one article that met the inclusion criteria was available in the library of Dr. Soetomo General Academic Hospital in Indonesia. Not all of them went through analysis since there were 230 duplicate articles. After that, abstract screening was performed and resulted in 71 articles with the same PICO. The full-text articleswere checked to assess the quality of the study. A total of 4 articles were inaccessible, and 55 articles were unselected as they did not meet the inclusion critera. The excluded articles had questionnaires which did not use FSFI and werenot conducted in series of postpartum period. Moreover, theirdata did not meet the eligibility. Consequently, 12 articles met the inclusion criteria and were proceeded in the meta-analysis. Fig. 1 shows the research flows starting fromm identification, inclusion, and exclusion, literature search, and reasons for exclusion.

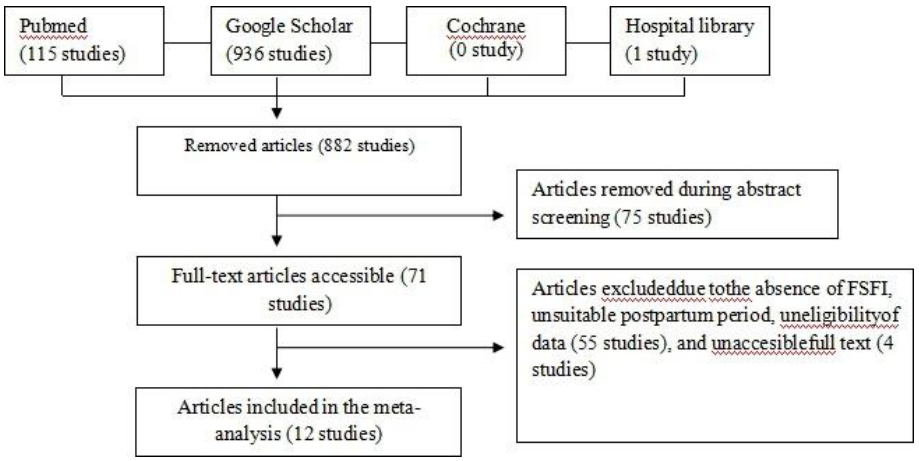

Fig. 1. Flowchart of the article selection process.

Characteristics of studies involvedare presented in Table 1 (Ref. [11, 15–25]), which contains the author's name, year of publication, research location, sample size, study design, intervention, and postpartum period. Articles were published in 2006 to 2019. The smallest sample size was 31 participants, and the largest was 450 participants. Overall, 1029 women were identified to be in the cesarean section group, and 1115 women were categorized asthe vaginal delivery group. The risk of bias in Non-randomized Studies-of Interventions (ROBINS-I) was employed to assess each study quality. The research assessment was different from that for Randomized Controlled Trial studysince it examined seven bias criteria due to confounding, selection of participants, classification of interventions, deviations from intended interventions, missing data, the measurement of outcomes, and the selection of the reported result. The assessment summarized that all the included studies had a high risk of bias. High bias occuredin the confounding domain because most studies had confounderssuch as breastfeeding conditions and a history of dyspareunia prior to deliverythat could cause dyspareunia as well. High bias also occuredduring the selection of participantsas the the participants were grouped after the intervention. Besides, the measurement of outcomes might also be the reason for a high bias since the rater already knew the participantsin the intervention and control groups. Normally, a low bias might appear whenthe selection of participants is carried out blindly.

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Table 1. Researchcharacteristics.

Study	Year	Country	Study design	Intervention	Sample size (PA/PV)	Postpartum period
Dabiri [15]	2014	Iran	Cross-sectional	Episiotomy with elective cesarean section	150 (69/81)	3.6
Lurie [16]	2013	Israel	Cohort	Episiotomy with elective cesarean section	31 (17/14)	3.6
Irwanto S [11]	2016	Indonesia	Cross-sectional	Mediolateral episiotomy with elective cesarean section	60 (30/30)	3
Irwanto Y [17]	2019	Indonesia	Cross-sectional	Mediolateral episiotomy with elective cesarean section	90 (45/45)	3
Baksu [18]	2006	Turki	Cohort	Mediolateral episiotomy with elective cesarean section	248 (92/132)	6
Barbara [19]	2015	Italia	Cohort	Vaginal delivery (intact perineum, perineal laceration, episiotomy, and elective cesarean section)	224 (92/132)	6
Sayed [20]	2017	Mesir	Cross-sectional	Vaginal delivery (intact perineum, perineal laceration, episiotomy, and elective cesarean section)	277 (137/140)	6
Alesheikh [21]	2016	Iran	Cross-sectional	Vaginal delivery (intact perineum, perineal laceration, episiotomy, and elective cesarean section)	450 (225/225)	6
Saydam [22]	2017	Turki	Cross-sectional	Vaginal delivery (intact perineum, perineal laceration, episiotomy, and cesarean section)	142 (77/65)	6,12
Moghadam [23]	2019	Iran	Cohort	Mediolateral episiotomy with elective cesarean section	107 (58/49)	6,12
Eid [24]	2015	Mesir	Cohort	Episiotomy with elective cesarean section	200 (110/90)	3
Cai [25]	2013	China	Case-control	Episiotomy with elective cesarean section	165 (77/88)	12

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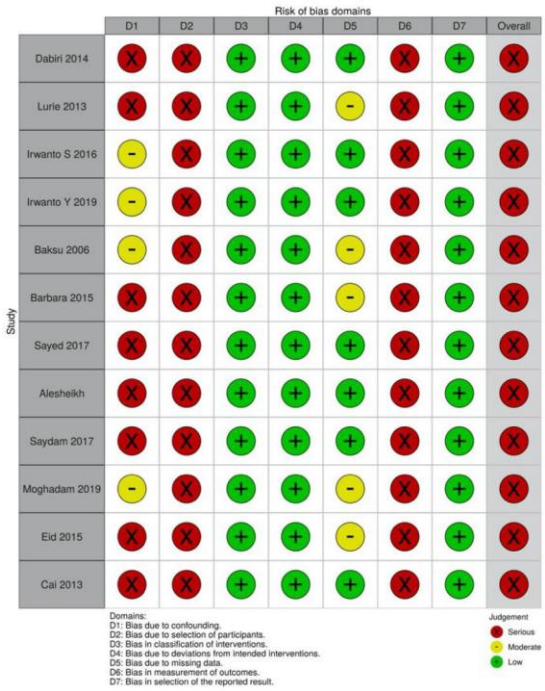

Fig. 2. Bias risk assessment ofincluded studies usingthe ROBINS-I assessment tool.

3.1 Meta-analysis of 3-month postpartum

Five studies involved 531 samples (271 samples in the cesarean delivery group and 260 samples in the vaginal delivery group) (Fig. 3). The results showed a I^2-value of 62% indicates that the studies were heterogenous, and thus the random-effects model was used for analysis. The diamond intersected the confidence interval line and indicated that there was no statistically significant difference in dyspareunia rates after 3-month of postpartum after cesarean delivery and vaginal delivery (MD = 0.18; 95% CI = –0.19–0.54; *P* = 0.35).

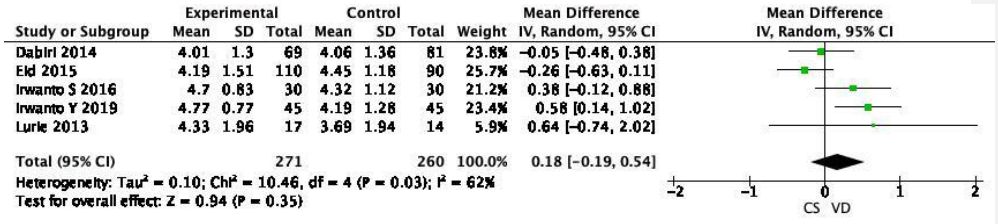

Fig. 3. Forest plot of dyspareunia in 3-month postpartumaccording to FSFI scores.

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Notes: SD, standard deviation; IV, inverse variance; CI, confidence interval; df, degrees of freedom.

3.2 Meta-analysis of 6-month postpartum

Eight studies hada total of 1,548 samples (790 samples in the cesarean delivery group and 758 samples in the vaginal delivery group) (Fig. 4). I^2 value of 97% indicated that the studies were heterogenous and thus analyzed using the random-effects model. The study showed the diamond intersected the confidence interval line. There was no statistically significant difference in the dyspareunia rate in 6-month postpartum after cesarean delivery and vaginal delivery (MD = 0.43; 95% CI = –0.28–1.14; *P* = 0.23).

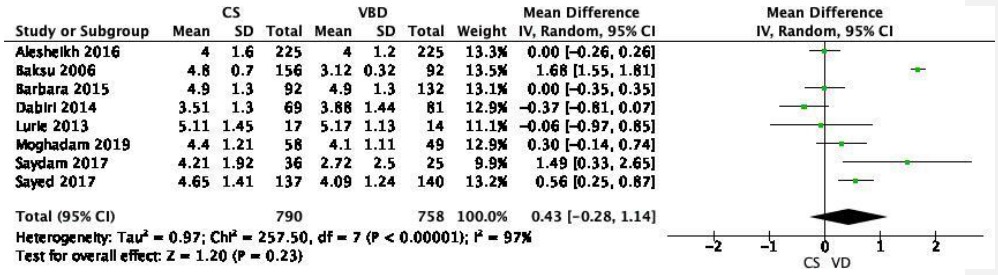

Fig. 4. Forest plot of dyspareunia in 6-month postpartum according to FSFI scores.

Notes: SD, standard deviation; IV, inverse variance; CI, confidence interval; df, degrees of freedom.

3.3 Meta-analysis of 12-Month Postpartum

Three studies reviewed possessed 353 samples (176 samples in the cesarean delivery group and 177 samples in the vaginal delivery group) (see Fig. 5). I^2-value of 51% indicatedthat heterogeneity was found between the studies, and thusthe random-effects model was employed for analysis.The result demonstrated the diamond intersected the confidence interval line, and there was no statistically significant difference in dyspareunia ratesin 12-month postpartum after cesarean sectionand vaginal delivery (MD = 0.12; 95% CI = –0.23–0.4; *P* = 0.50).

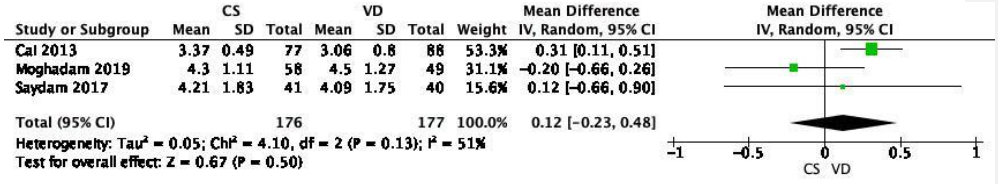

Fig. 5. Forest plot of dyspareunia in 3-month postpartum according to FSFI scores.

Notes: SD, standard deviation; IV, inverse variance; CI, confidence interval; df, degrees of freedom.

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In the forest plot, the dyspareunia score in 6-month postpartum showed high heterogeneity with 97% I^2. However, the studies obtained the same quality or weight (see Fig. 5), and thus a sensitivity analysis was not performed.

3.4 Publication bias

In each 3-month, 6-month, and 12-month postpartum, there were only 5 studies, 8 studies, and 3 studies. The funnel plot ofdyspareunia in 3-month postpartum showed a fairly symmetrical picture, where there waslittle possibility of publication bias (Fig. 6). While, in 6-month postpartum, it showed an asymmetrical picture, suggesting publication bias (Fig. 7). Similar to the picture in 3-month postpartum, the funnel plot ofdyspareunia in 12-month postpartum was fairly symmetrical (Fig. 8).

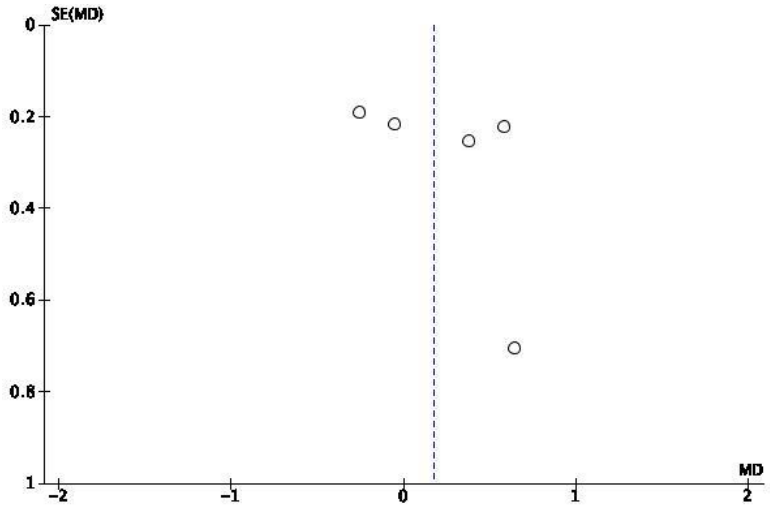

Fig. 6. Funnel plot of dyspareunia in 3-month postpartumaccording to FSFI score.

Notes: SE, standard error; MD, mean difference.

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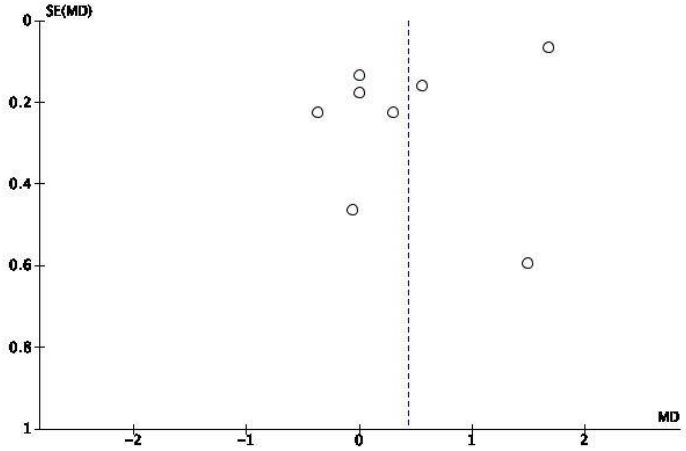

Fig. 7. Funnel plot of dyspareunia in 6-month postpartum according to FSFI score.

Notes: SE, standard error; MD, mean difference.

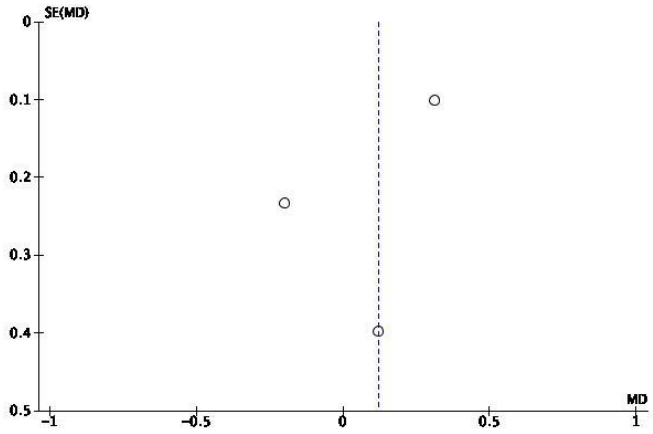

Fig. 8. Funnel plot of dyspareunia in 12-month postpartum according to FSFI score.

Notes: SE, standard error; MD, mean difference.

4. Discussion

The forest plot scores for dyspareunia in3-month postpartum highlighted that the diamond tilted more to the right,

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proving that the FSFI score was higher in cesarean section (MD = 0.18; 95% CI = 0.19–0.54; $P = 0.35$; $I^2 = 62\%$). In other words, casarean section could pose lower dyspareunia. However, the difference was not statistically significant in 3-month postpartum after cesarean section and vaginal delivery. The forest plot of dyspareunia rates in 6-month of postpartum illustrated that the diamond tilted more to the right, proving that the FSFI score was higher or lower dyspareunia was foundin cesarean section. The diamond intersected the vertical line, and there was no statistically significant difference in dyspareunia ratesin 6-month postpartum after cesarean section and vaginal (MD = 0.43; 95% CI = –0.28–1.14; $P = 0.25$; $I^2 = 97\%$). The heterogeneity between the studies was very highat 97% due to different numbers of samples with the largest sample sizeof 450 samples in Alesheikh's study and the smallest of 31 samplesin Lurie's study. Besides, it can occur due to different patient characteristics, such as a socio-economic factor, age range, and level of education, as well as confounding factors including the absence of data on the type of episiotomy and skin incision in cesarean section. A research conducted by Alligood-Percoco NR, *et al*. [26] stated that as many as 21.2% of women reported dyspareunia at 6-month postpartum.

The forest plot of dyspareunia ratesin 12-month of postpartum demonstrated that the diamond tilted more to the right. It means higher FSFI score in cesarean section indicated lower dyspareunia. However, there was no statistically significant difference in dyspareunia rates in 12-month postpartum after cesarean sectionand vaginal delivery (MD = 0.12; 95% CI = –0.23–0.48; $P = 0.5$; $I^2 = 51\%$). From the overall forest plots in different postpartum periods, it was summarized that there wasno significant difference between cesarean section and vaginal delivery. A similar study by Fan in China examined differences in postpartum sexual function aftercesarean section and vaginal delivery. The results found no difference in sexual satisfaction of women in 3-month and 6-month of postpartum [14].

Regarding the diamond leaning to the right, it was evident that the dyspareunia rate was higher in vaginal delivery than in cesarean section. The meta-analysis by Manresa reported that mothers undergoing vaginal delivery with an intact perineum could still experience dyspareunia, higher especially in women who went through perineal tear or episiotomy during labor [12].

Even in elective cesarean section, there are still complaints of dyspareuniadue to breastfeeding factors, fatigue factors, or stress factors. A study on6-month postpartum concluded that among breastfeeding women (OR = 2.89; 95% CI = 2.33–3.59), women who were exhausted (OR 1.60, 95% CI 1.30–1.98) and were in stressful conditions (OR 1.55, 95% CI 1.18–2.02) had a higher risk of dyspareunia [26]. Besides, women with a surgical wound defect (niche) with adhesions after having caserean section were at risk of dyspareunia. A systematic review study in 2014 revealed that 18% of women with surgical wound defects (niche) complained of dyspareunia [27].

Cesarean sectioncould maintain the function of the woman's pelvic floor. A meta-analysis comparing cesarean sectionand vaginal delivery reported that pelvic floor muscle strength, vaginal muscle tension, and maximum urinary flow rate after cesarean sectionwere better than vaginal delivery [13]. Although maternal characteristics at birth such as age or Body Mass Index (BMI) increase the risk of pelvic floor dysfunction pregnancy and delivery factors affect the pelvic floor anatomy and function [28].

A cesarean section, despite being performed electively, still carries a high risk of complications. A previous meta-analysis study showed that women who underwentcesarean delivery had a higher risk of death (OR = 3.10) and postpartum infection (OR = 2.83) [29]. Other studies have shown that cesarean delivery poseda higher risk of hysterectomy (OR = 1.30), obstetric shock (OR = 2.54), and anesthetic complications (OR = 2.18) [30]. Obstetric shock includes bleeding shock, pulmonary embolism, amniotic fluid embolism, and sepsis [31,32].

From the above discussion, distinguished postpartum periods in the research were aimed at reducing the time factor as a confounder. However, there werestill some limitations in this study. First, the results might be influenced by many other confounding variables, such as the absence of data on the type of episiotomy in several studies andtype of abdominal incision in cesarean section, breastfeeding status, and a history of previous dyspareunia. As a result, the data obtained had high heterogeneity. Second, this current study implied a fairly high bias because the selection of the subjects was not done blindly. The future research could use randomized controlled trials design with a blind subject selection to reduce the research bias.

5. Conclusions

In all 3-month, 6-month, and 12-month of postpartum, the dyspareunia rate was likely lower in cesarean section although the difference was not statistically significant. Further meta-analysis studies need to evaluate other indicators compared between cesarean sectionand vaginal delivery. More studies, especially RCTs, can be included for possible further meta-analyses. It is important to inform pregnant women that vaginal delivery is not a major contributing factorto sexual dysfunction. Importantly, cesarean section should only be undertaken when there are medical indications for both mother and the fetus.

Author contributions

EMK: develop ideas and analysis data, ZMP: collecting and processing data, HP: finishing data and manuscript preparation.

Ethics approval and consent to participate

Not applicable.

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Conflict of interest

The authors declare no conflict of interest.

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Comparison of dyspareunia using female sexual index score at 3 months, 6 months and 12 months post vaginal and caesarean delivery: Meta-analysis

--Manuscript Draft--

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Full Title:	Comparison of dyspareunia using female sexual index score at 3 months, 6 months and 12 months post vaginal and caesarean delivery: Meta-analysis
Article Type:	Review
Section/Category:	Gynecological disease
Keywords:	cesarean section; cesarean delivery; vaginal birth; vaginal delivery; Dyspareunia; FSFI
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Abstract:	Background The cesarean delivery rate has been increasing all over the world over the last few years. There is a change in mindset due to the change in women's role, let alone the perception stating that cesarean delivery can decrease the risk of having pelvic floor dysfunction and maintain the sexual functions. Therefore, women think that cesarean delivery is a good choice for delivery, even it has no indications. This study aimed at analyzing and providing quantitative data by comparing the dyspareunia based on FSFI scores between cesarean section and vaginal delivery. Method The systematic data search was done in the Medical Database (PUBMED, Google Scholar, Cochrane) and the archives of RSUD Dr. Soetomo. The inclusion criteria consisted of (1) observational study with the following keywords "cesarean section" , "cesarean delivery" , "vaginal birth" , "vaginal delivery" , "dyspareunia" , "FSFI" , (2) all included papers could be accessed completely, and the data that had been obtained could be analyzed accurately. Result Twelve observational studies toward 2,144 patients had been analyzed. The dyspareunia score after 3 months of delivery between cesarean section and vaginal delivery had a Mean Difference (MD) of 0.18 and 95% CI of -0.19 to 0.54 (P-value of 0.35). The dyspareunia score after 6 months of delivery between cesarean section and vaginal delivery had a Mean Difference (MD) of 0.43 and 95% CI of -0.28 to 1.14 (P-value of 0.23). Meanwhile, the dyspareunia score after 12 months of delivery between cesarean section and vaginal delivery had a Mean Difference (MD) of 0.12 and 95% CI of -0.23 to 0.48 (P-value of 0.50). From those three forest plots, all diamonds were

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	tangent to the vertical line (no effect) and had a p>0.05, so it could be inferred that no significant statistical difference was found between the experimental group (cesarean section) and the control group (vaginal delivery). Those three studies were heterogeneous since I 2 was more than 50%. Conclusion This meta-analysis concludes that there is a tendency for 3 month, 6 month, and 12 months of post delivery dypareunia rate to be lower in cesarean section than vaginal delivery, but it's not staistically significant.

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Comparison of dyspareunia using female sexual index score at 3 months, 6 months and 12 months post vaginal and caesarean delivery: Meta-analysis

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Comparison of dyspareunia using female sexual index score at 3 months, 6 months and 12 months post vaginal and caesarean delivery: Meta-analysis

Abstract

Background: The cesarean delivery rate has been increasing all over the world over the last few years. There is a change in mindset due to the change in women's role, let alone the perception stating that cesarean delivery can decrease the risk of having pelvic floor dysfunction and maintain the sexual functions. Therefore, women think that cesarean delivery is a good choice for delivery, even it has no indications. This study aimed at analyzing and providing quantitative data by comparing the dyspareunia based on FSFI scores between cesarean section and vaginal delivery.

Method: The systematic data search was done in the Medical Database (PUBMED, *Google Scholar, Cochrane*) and the archives of RSUD Dr. Soetomo. The inclusion criteria consisted of (1) observational study with the following keywords *"cesareansection"*, *"cesarean delivery"*, *"vaginal birth"*, *"vaginal delivery"*, *"dyspareunia"*, *"FSFI"*, (2) all included papers could be accessed completely, and the data that had been obtained could be analyzed accurately.

Result: Twelve observational studies toward 2,144 patients had been analyzed. The dyspareunia score after 3 months of delivery between cesarean section and vaginal delivery had a *Mean Difference* (MD) of 0.18 and 95% CI of -0.19 to 0.54(P-value of 0.35). The dyspareunia score after 6 months of delivery between cesarean section and vaginal delivery had a *Mean Difference* (MD) of 0.43 and 95% CI of -0.28 to 1.14 (P-value of 0.23). Meanwhile, the dyspareunia score after 12 months of delivery between cesarean section and vaginal delivery had a *Mean Difference* (MD) of 0.12 and 95% CI of -0.23 to 0.48 (P-value of 0.50). From thosethree forest plots, all diamonds were tangent to the vertical line *(no effect)* and had a $p>0.05$, so it could be inferred that no significant statistical difference was found between the experimental group (cesarean section) and the control group (vaginal delivery). Those three studies were heterogeneous since I^2 was more than 50%.

Conclusion: This meta-analysis concludes that there is a tendency for 3 month, 6 month, and 12 months of post delivery dypareunia rate to be lower in cesarean section than vaginal delivery, but it's not staistically significant.

Keywords: Cesarean section, cesarean delivery, vaginal birth, vaginal delivery, dyspareunia, FSFI

Introduction

In recent years, the number of caesarean deliveries has increased worldwide. Approximately 30% of births in 2015 were caesarean deliveries, which is almost three times the number of caesarean deliveries in 1980, which was 11% (Boerma, 2018). This figure is significantly above the WHO recommendation rate, which is 15-20% (WHO, 2015). The number of caesarean delivery in the US in 2015 reached 32% of total births, of which 2.5% were caesarean delivery at the request of the mother (ACOG, 2018). The birth rate in Italy is 33.7%, which makes Italy the country in Europe that has the highest caesarean delivery rate (Masciullo, 2020).

The delivery process is associated with the incidence of post partum dyspareunia. Dyspareunia is a genital pain disorder that adversely affects a woman's quality of life. This disorder occurs with a high prevalence and imposes a significant financial burden on women and the health care system (Sorensen, 2018). McDonald's cohort study (2015) stated that women who gave birth at 6 months using caesarean delivery had less risk factors for dyspareunia than women who delivered vaginally with an intact perineum (OR 0.76). However, at 18 months postpartum, women with elective caesarean delivery had a greater risk factor for dyspareunia than women who delivered vaginally with intact perineum (OR 1.71) (McDonald, 2015). There is a change in mindset due to the changing roles of women. Where women currently have greater autonomy rights, have career orientation, and some experience late marriages (Kaur, 2019). Plus the assumption that caesarean delivery can reduce the risk of pelvic floor injuries and maintain good sexual function (Souza, 2013). Therefore women think that caesarean delivery is a viable option for delivery, even without indication, which is referred to as CSMR (Cesarean Section on Maternal Request) (Masciullo, 2020). However, from the McDonald research above, it was concluded that postpartum dyspareunia could still occur even though a woman underwent caesarean delivery.

Blomquist in 2014 conducted a study on women after vaginal delivery, women who experienced forceps delivery and those who gave birth to babies weighing more than 4 kg, more often experienced dyspareunia (Blomquist, 2014). The results of McDonald's research on women after 6 months of childbirth also support this (Mc Donald, 2015). In contrast to Fauconnier's research in 2011. His research on 1 year postpartum women, stated that childbirth with tools, episiotomy, and perineal trauma did not increase the risk of postpartum dyspareunia (Fauconnier, 2011). Likewise with Irwanto's research in 2016 at Dr. Soetomo General-Academic Hospital in Indonesia, who stated that there was no significant difference in the female sexual function index score in patients with caesarean and vaginal delivery (Irwanto, 2016). This proves that even during vaginal delivery, sexual function remains good.

For a meta-analysis of dyspareunia, Manresa in 2019 examined the incidence of perineal pain and dyspareunia after vaginal delivery. The results of his study showed that the incidence of

perineal pain and dyspareunia was more in women who underwent an episiotomy (Manresa, 2019). The second meta-analysis study conducted by Yang in 2019, compared caesarean and vaginal delivery with postpartum pelvic floor function, concluded that caesarean delivery was preferred to maintain pelvic floor function (Yang, 2019). Another meta-analysis study by Fan in 2017 which was specifically conducted in China, concluded that there was no difference in sexual satisfaction among women after caesarean delivery and vaginal delivery, and that there was a difference in the time to initiate postpartum intercourse between the 2 methods of delivery (Fan, 2017). .

Based on this background, the aim of the study was to determine the comparison of dyspareunia according to female sexual function index score between post caesarean delivery and vaginal delivery, which were divided based on postpartum months, namely 3 months, 6 months, and 12 months with the hope that the results of this study can provide a conclusions quantitative through meta-analysis. This study provides the benefit of studying the impact of caesarean and vaginal delivery on the occurrence of dyspareunia in health care providers and is a reference for educating women about the various problems caused by childbirth that can cause dyspareunia.

Hypothesis: There are differences in dyspareunia according to the 3-month, 6-month, and 12-month female sexual function index scores between caesarean and vaginal delivery.

Methods

The meta-analysis study was conducted using the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-analyzes) guide and the Cochrane Handbook for Systematic Reviews of Interventions. Systematic journal searched using PubMed, Google scholar, and the Cochrane Central Register of Controlled Trials to obtain articles from randomized control trials and observational studies examining comparisons of dyspareunia according to female sexual function index (FSFI) scores between post-caesarean and vaginal delivery. Journals search uses a combination of several terms, namely "Cesarean section", "Vaginal delivery", "Dyspareunia", and "FSFI". The research flow is keyword determination / PICO identification, literature search based on PRISMA Flowchart, literature analysis and statistical analysis, discussion and conclusion. PICO identification in this study is P / Population (primiparous women), I / Intervention (elective caesarean section), C / Comparison (vaginal delivery; intact perineum, gr I-II perineal rupture, small episiotomy) and O / Outcome (post-dyspareunia 3 months, 6 months, 12 months). Inclusion criteria in this study were case control and cohort that examined dyspareunia according to the FSFI score between postpartum caesarean delivery and vaginal delivery, the population of patients with vaginal delivery were primiparous patients with a history of labor with intact perineum, grade I-II perineal rupture, or small episiotomy where the patient Caesarean section is a patient who underwent

elective surgery, the study was conducted in the postpartum population of 3 months, 6 months, 12 months, all included articles were completely accessible and the data obtained could be analyzed accurately. Studies involving multiparous patients, patients with complicated vaginal delivery, gr III or gr IV perineal rupture and patients undergoing vaginal delivery by performing assistive devices, namely vacuum or forceps, patients with emergency cesarean section, assessment of dyspareunia who did not use FSFI were not included in the meta analysis.

Assessment of study quality

The study quality assessment was carried out by the authors of 3 independently assessing the validity of each study using the criteria listed in the Cochrane Handbook for Systematic Reviews of Interventions. The author is there to discuss if there are differences of opinion. Each study was grouped and assessed according to the quality category: A, the study has a low risk of bias; B, study has a medium risk of bias, or C, study has a high risk of bias. Data extraction was carried out to get the goals, objectives and research questions of this study.

Statistical analysis

The clinical outcome analyzed was dyspareunia on the FSFI score, with nominal data namely Mean Difference and Standard Deviation. The flow of statistical analysis includes: data extraction, effect size, homogeneity test, homogeneous fixed effect model or heterogeneous random effect model, summary effect and forest plot. The combined statistical analysis and effect size meta-analysis were analyzed using the Review Manager (RevMan) software version 5.3. We calculated the combined mean and standard deviation (SD) and 95% confidence intervals from comparative analyzes of the respective literature and used when the results reported were using identical scales. All data were analyzed and calculated using the RevMan software version 5.3. With the confidence interval number used is 95%. The heterogeneity between studies was assessed from the results of p and I2. If $p > 0.05$, the combined research is said to be homogeneous. If $I2 = 0$ there is no variation, $I2 < 50\%$ is said to be homogeneous. If the data is homogeneous, analysis is carried out using a fixed effect model, if the data is heterogeneous, random effects model analysis is used. Researchers evaluated publication bias by using a funnel plot, which is an algorithm that assesses the symmetry of the funnel plot, through ranking correlation and analysis of the research plot.

Results

Based on Pubmed database, Google scholar, and the Cochrane Central Register of Controlled Trials, it was found that 1051 journal titles and abstracts were related to the search keywords. The keywords used are “cesarean section”, “cesarean delivery”, “vaginal birth”,

"vaginal delivery", "dyspareunia", "FSFI". Obtained 1 journal that entered the inclusion criteria from the library of Dr. Soetomo General-Academic Hospital in Indonesia. Therefore we get a total of 1052 journals. There were 230 journal duplications. After that the authors screened the abstract and found that 71 journals had the same PICO. Then the authors evaluate the journal in full text to assess the quality of the study. A total of 4 journals were inaccessible and 55 journals were excluded according to the exclusion criteria that the author set, namely questionnaires that did not use FSFI, the study was conducted not according to the month determined by the researcher, and data that did not meet the eligibility. There were 12 studies that met the criteria for inclusion in the meta-analysis. Figure 1 shows the flow regarding identification, inclusion and exclusion, the process of searching for journals, and reasons for exclusion.

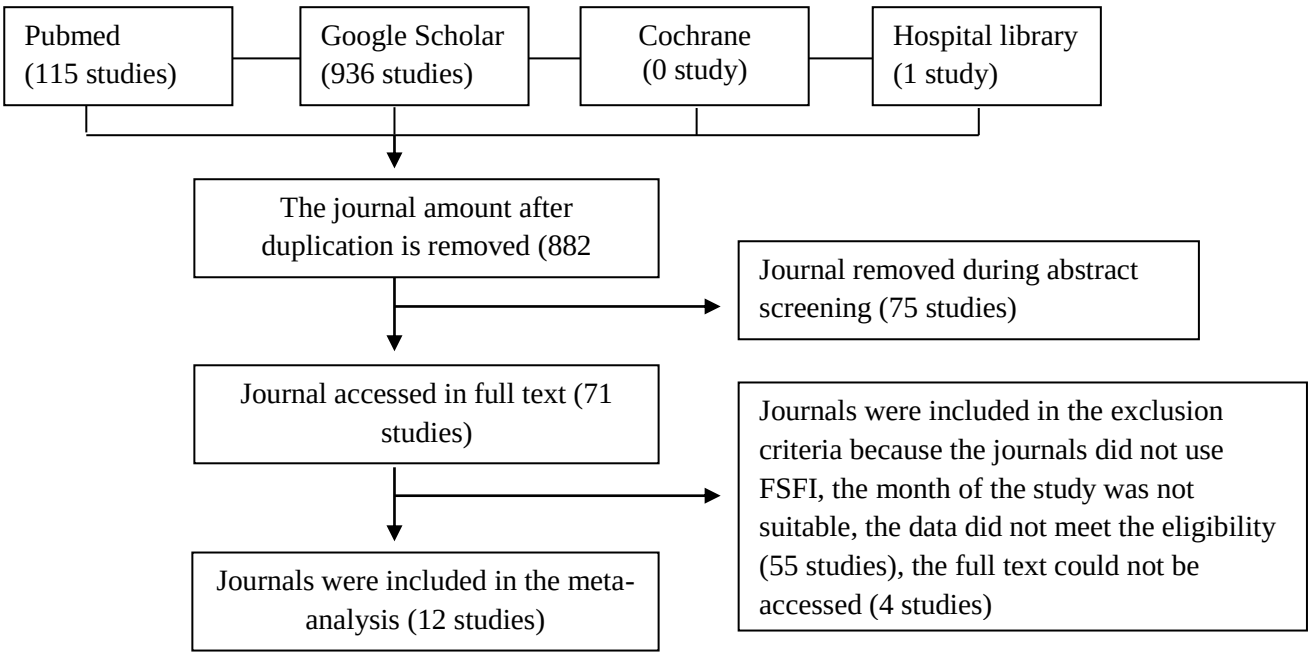

Figure 1. Flowchart of the study selection process

Study characteristics can be seen in table 1, which contains the author's name, year of publication, country of author, sample size, study design, intervention and time after delivery. Articles were published in the range 2006 to 2019. Sample sizes varied, with the smallest sample being 31 and the largest being 450, with a total of 1029 women in the caesarean delivery group and 1115 women in the vaginal delivery group. The assessment of study quality used the Risk Of Bias In Non-randomized Studies-of Interventions (ROBINS-I) assessment tool. This assessment is different from the assessment in the Randomized Controlled Trial study. There are 7 bias criteria in this table, consisting of bias due to confounding, bias due to selection of participants, bias in classification of interventions, bias due to deviations from intended interventions, bias due to

missing data, bias in measurement of outcomes, bias in selection of the reported result. From the table below, it can be concluded that all the included studies had a high risk of bias. High bias occurs in the confounding domain because in most studies it is found that confounders can cause dyspareunia as well, such as breastfeeding conditions and a history of dyspareunia before delivery. High bias also occurs in the domain selection of participants, because in the included studies, participants were divided after the intervention was carried out. In the domain of measurement of outcomes, there is also a high bias, because the outcome rater already knows the participant group, between intervention and control. It is said that the risk is low if blinding is carried out, so that the outcome assessor does not know the group of each participant.

Table 1. Study characteristics

Study	Year	Country	Study Design	Intervention	Sampel size (PA/PV)	Time after delivery
Dabiri	2014	Iran	Cross Sectional	Episiotomy with elective caesarean section	150 (69/81)	3,6
Lurie	2013	Israel	Cohort	Episiotomy with elective caesarean section	31 (17/14)	3,6
Irwanto S	2016	Indonesia	Cross Sectional	Mediolateral episiotomy with elective cesarean section	60 (30/30)	3
Irwanto Y	2019	Indonesia	Cross Sectional	Mediolateral episiotomy with elective cesarean section	90 (45/45)	3
Baksu	2006	Turki	Cohort	Mediolateral episiotomy with elective cesarean section	248 (92/132)	6
Barbara	2015	Italia	Cohort	Vaginal delivery (intact perineum, perineal laceration, episiotomy and elective cesarean section)	224 (92/132)	6
Sayed	2017	Mesir	Cross Sectional	Vaginal delivery (intact perineum, perineal laceration, episiotomy and elective cesarean section)	277 (137/140)	6
Alesheikh	2016	Iran	Cross Sectional	Vaginal delivery (intact perineum, perineal laceration, episiotomy and elective cesarean section)	450 (225/225)	6
Saydam	2017	Turki	Cross Sectional	Vaginal delivery (intact perineum, perineal laceration, episiotomy and cesarean section)	142 (77/65)	6,12
Moghadam	2019	Iran	Cohort	Mediolateral episiotomy with elective cesarean section	107 (58/49)	6,12
Eid	2015	Mesir	Cohort	Episiotomy with elective caesarean section	200 (110/90)	3
Cai	2013	China	Case Control	Episiotomy with elective caesarean section	165 (77/88)	12

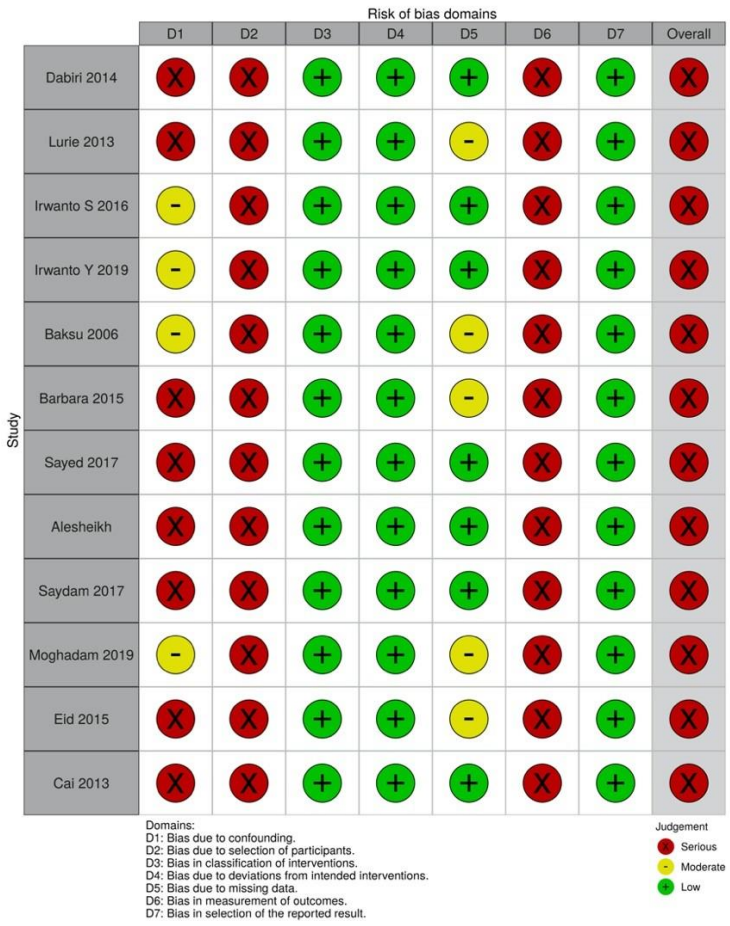

Figure 2. Bias risk assessment for each of the included articles using the ROBINS-I assessment tool

3-month meta-analysis

Five studies totaling 531 samples (271 samples in the caesarean delivery group and 260 samples in the vaginal delivery group) (Figure 3). 62% I2 result indicates that heterogeneity is found between studies, so the analysis used is the random-effects model. The combined mean difference was 0.18, and the 95% CI was - 0.19 to 0.54 (P 0.35). Because P> 0.05 and diamond intersected the confidence interval line, the results of this analysis showed that there was no statistically significant difference in dyspareunia according to the FSFI score between caesarean delivery and vaginal delivery at 3 months postpartum.

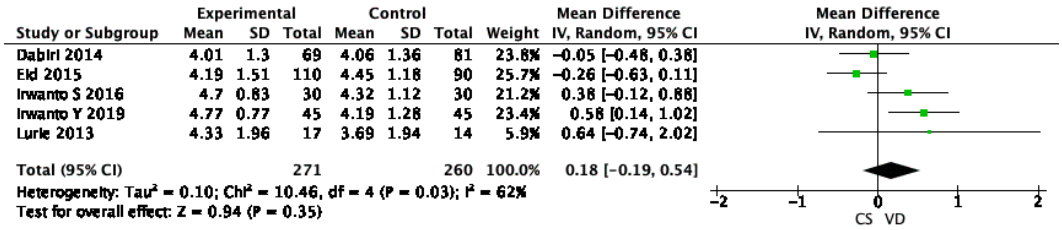

Figure 3. Forest plot of dyspareunia according to FSFI score 3 months postpartum. SD: standard deviation; IV: inverse variance; CI: confidence interval; df: degress of freedom

6-month meta-analysis Eight studies with a total of 1548 samples (790 samples in the caesarean delivery group and 758 samples in the vaginal delivery group) (Figure 4). The I2 result of 97% indicates that heterogeneity is found between studies, so the analysis used is the random-effects model. The combined mean difference was 0.43, and the 95% CI was - 0.28 to 1.14 (P 0.23). Because P> 0.05 and diamond intersected the confidence interval line, the results of this analysis indicated that there was no statistically significant difference in the mean dyspareunia according to the FSFI score between caesarean delivery and vaginal delivery at 6 months postpartum.

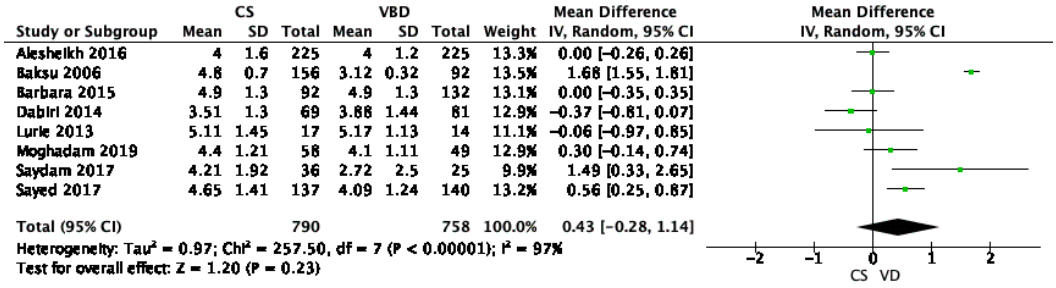

Figure 4 Forest plot of dyspareunia according to FSFI score 6 months postpartum. SD: standard deviation; IV: inverse variance; CI: confidence interval; df: degress of freedom

12-month meta-analysis

Three studies totaling 353 samples (176 samples in the caesarean delivery group and 177 samples in the vaginal delivery group) (Fig. 5). The I2 result of 51% indicates that heterogeneity is found between studies, so the analysis used is the random-effects model. The combined mean difference

was 0.12, and the 95% CI was - 0.23 to 0.48 (P 0.50). Since P> 0.05 and diamond intersected the confidence interval line, the results of this analysis showed that there was no statistically significant difference in dyspareunia according to FSFI score between caesarean delivery and vaginal delivery at 12 months postpartum.

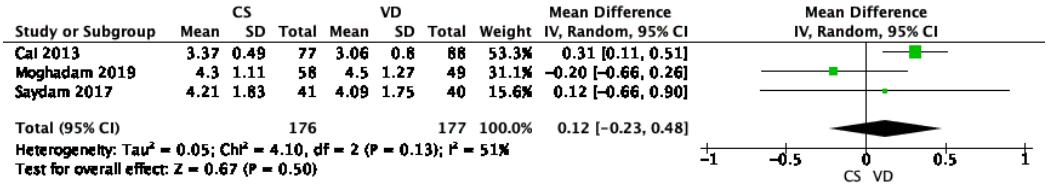

Figure 5 Forest plot of dyspareunia according to FSFI score 12 months postpartum. SD: standard deviation; IV: inverse variance; CI: confidence interval; df: degress of freedom

In the forest plot the dyspareunia score 6 months postpartum showed high heterogeneity with I2 97%. However, the included studies obtained the same quality or weight, it can be seen in Figure 5, so we did not do a sensitivity analysis.

Publication bias

In the postpartum dyspareunia score test at 3 months there were only 5 studies, in the 6 months postpartum dyspareunia score test there were only 8 studies, and in the 12 months postpartum dyspareunia score test only 3 studies were obtained. The funnel plot in dyspareunia according to the FSFI score 3 months post shows a fairly symmetrical picture, where there is little possibility of publication bias (Figure 6). The funnel plot in dyspareunia according to the FSFI score 6 months postpartum showed asymmetrical features, suggesting publication bias (Figure 7). The funnel plot in dyspareunia according to the FSFI score 12 months postpartum shows a fairly symmetrical picture (Figure 8).

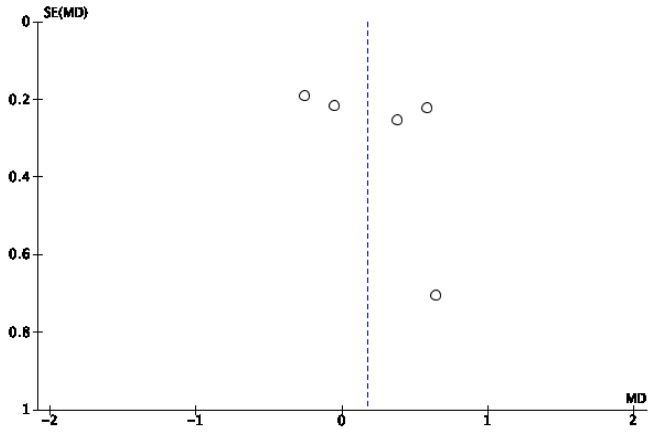

Figure 6 Funnel plot of dyspareunia according to FSFI score 3 months postpartum. SE: standard error; MD: mean difference

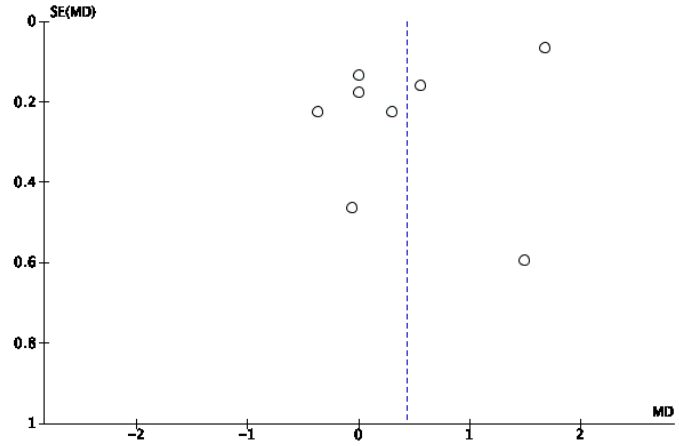

Figure 7 Funnel plot of dyspareunia according to FSFI score 6 months postpartum. SE: standard error; MD: mean difference

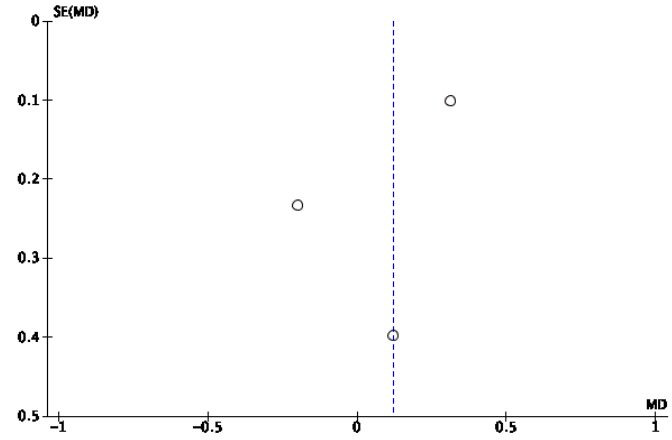

Figure 8 Funnel plot of dyspareunia according to FSFI score 12 months postpartum. SE: standard error; MD: mean difference

Discussion

The results of the forest plot score for dyspareunia at 3 months postpartum obtained MD 0.18, 95% CI -0.19 to 0.54, p = 0.35, I2 = 62%. Diamond tilted more to the right, proving that the FSFI score was higher in caesarean deliveries. A higher FSFI score means lower dyspareunia. However, because diamond crossed the vertical line and p> 0.05, there was no statistically significant difference in the dyspareunia score between caesarean delivery and vaginal delivery at 3 months postpartum. The results of the forest plot dyspareunia score at 6 months postpartum obtained MD 0.43, 95% CI -0.28 to 1.14, p = 0.25, I2 = 97%. Diamond tilted more to the right, proving that the FSFI score was higher in caesarean deliveries. A higher FSFI score means lower dyspareunia. However, because diamond intersected the vertical line and p> 0.05, there was no statistically significant difference in the dyspareunia score between caesarean delivery and vaginal delivery at 6 months postpartum. The heterogeneity between studies at month 6 is very high, namely 97%, it can be caused by the difference in the number of samples that are quite far between studies, with the largest sample size in Alesheikh's study of 450 samples, and the smallest number of samples in Lurie's study of 31 samples. In addition, heterogeneity can occur due to different patient characteristics, for example from a socio-economic perspective, age range, and level of education.As well as confounding factors, such as the absence of data on the type of episiotomy and the type of skin skin incision in caesarean delivery.

The results of forest plot dyspareunia scores at 12 months postpartum obtained MD 0.12, 95% CI -0.23 to 0.48, p = 0.5, I2 = 51%. Diamond tilted more to the right, proving that the FSFI score was higher in caesarean deliveries. A higher FSFI score means lower dyspareunia. However, because diamond intersected the vertical line and p> 0.05, there was no statistically significant difference in the dyspareunia score between caeasarean delivery and vaginal delivery at 12 months postpartum. When compared between the 3rd (representing short-term), 6th, and 12th (representing long-term) postpartum months, the three forest plot results together produce the conclusion that there is no significant difference between caesarean and vaginal delivery. A similar study by Fan in 2017 in China examined differences in postpartum sexual function between caesarean and vaginal delivery. The results found no difference in sexual satisfaction in women at 3 months and 6 months of post partum. Sexual satisfaction includes dyspareunia options in it (Fan, 2017).

Regarding the right-leaning diamond, it is evident that the dyspareunia rate is higher in vaginal deliveries than caesarean deliveries. The meta-analysis by Manresa reports that vaginal delivery with intact perineum can still experience dyspareunia, with a higher incidence rate in women who experience perineal tear or episiotomy during labor (Manresa, 2019).

Even in elective caesarean delivery, there are still complaints of dyspareunia. Some of the causes are breastfeeding factors, fatigue factors, stress factors. A study conducted 6 months postpartum concluded that among women who were breastfeeding (OR 2.89, 95% CI 2.33-3.59), women were exhausted (OR 1.60, 95% CI 1.30-1.98) , and women in stressful conditions (OR 1.55, 95% CI 1.18-2.02) had a higher risk of dyspareunia (Alligood-Percoco, 2016). In addition, in women after caesarean delivery, if there is a surgical wound defect (niche) with adhesions, there is a risk of developing dyspareunia. In a systematic review study in 2014, it was found that 18% of women with surgical wound defects (niche) complained of dyspareunia (Bij de Vaate, 2014).

One of the advantages of caesarean delivery is that it maintains the function of the woman's pelvic floor. A meta-analysis comparing caesarean delivery and vaginal delivery, reported that pelvic floor muscle strength, vaginal muscle tension, and maximum urinary flow rate in women after caesarean delivery were better than vaginal delivery (Yang, 2019). Although maternal characteristics at birth such as age or BMI increase the risk of PFD, labor and birth factors play an equally important role in pelvic floor anatomy and function (Urbankova, 2019).

A caesarean delivery, although performed electively, still carries a high risk of complications. Mascarello's meta-analysis study in 2016 showed that women with caesarean delivery had a higher risk of death (OR 3.10) and postpartum infection (OR 2.83) (Mascarello, 2016). Other studies have shown that caesarean delivery has a higher risk of hysterectomy (OR 1.30), obstetric shock (OR 2.54), and anesthetic complications (OR 2.18) (Farchi, 2010). Obstetric shock includes bleeding shock, pulmonary embolism, amniotic fluid embolism, sepsis (Habek, 2008).

From the above discussion, the authors distinguished postpartum time to reduce the time factor as a confounder. However, there are still some limitations in this study. First, there are many other variables that can confound data, such as the absence of data on the type of episiotomy in several studies, no data on the type of abdominal incision in caesarean delivery, breastfeeding status, and a history of previous dyspareunia. So that the data between studies obtained high heterogeneity. Second, in the study we found, there was a fairly high bias because there was no blinding from the research subjects and from the researchers themselves, so it is hoped that in the future there will be randomized controlled trials studies that discuss this topic to reduce research bias.

Conclusion

There was a tendency for dyspareunia rates at 3 months, 6 months and 12 months postpartum to be lower in caesarean delivery, but it was not statistically significant. Further research needs to be conducted a meta-analysis to evaluate other indicators that can compare between caesarean delivery

and vaginal delivery. More studies can be included, especially RCTs, for possible meta-analyzes in future studies. It is important to inform pregnant women that vaginal delivery is not a major factor in sexual dysfunction. Caesarean delivery should only be undertaken when there are medical indications for both the mother and the fetus.

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COVER LETTER

Address to the Chief of Editor:
Editor in Chief
Clinical and Experimental Obstetric and Gynecology

Dear Editor

We are pleased to submit our manuscript entitled: "**Comparison of dyspareunia using female sexual index score at 3 months, 6 months and 12 months post vaginal and caesarean delivery: Meta-analysis**", for consideration as an article review. This study is a meta analysis. The readers will be interested to read this article because it can give a recent view of the prevention and risk of postpartum dyspareunia by comparing normal deliveries and cesarean section deliveries. So far, the view of society still focuses on giving birth in sectio caesarea even sometimes without the correct indication as a preventive measure against dyspareunia. This research can provide education to the public on how evidence is appropriate prevention of dyspareunia. This manuscript has not been previously published and is not under consideration in the same or substantially similar form in any other peer-reviewed media.

Sincerely,

Eighty Mardiyan Kurniawati, Ph.D

Transfer of Copyright Agreement

I and my colleagues who the undersigned, declare that the article entitled: "**Comparison of dyspareunia using female sexual index score at 3 months, 6 months and 12 months post vaginal and caesarean delivery: Meta-analysis**" is original, and that I (as author or co-author) hold exclusive copyright of the material. I hereby transfer exclusive copyright for this material to "**Clinical and Experimental Obstetrics and Gynecology**" through the publication. All authors agree to the terms of copyright transfer as indicated along with the manuscript submission process.

April 18, 2021

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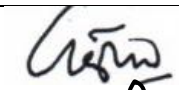
Dr. Eighty Mardiyan Kurniawati, dr., Sp.OG (K)	
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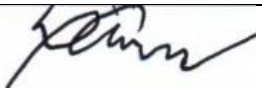
Hari Paraton, dr., Sp.OG(K)	

Comparison of Dyspareunia Using Female Sexual Index Score in 3-Month, 6-Month, and 12-Month Postpartum After Vaginal Delivery and Cesarean Section: Meta-analysis

Abstract

This study aimed to compare the quantitative data of dyspareunia based on FSFI scores between cesarean section and vaginal delivery. The systematic data search was done in some medical databases (PUBMED, Google Scholar, Cochrane) and the archives of Dr.Soetomo General Academic Hospital.The inclusion criteria of the articles under review consisted of (1) those which were observational studies with the following keywords "cesarean section","cesarean delivery","vaginal birth","vaginal delivery","dyspareunia", and "FSFI". The other criteria were (2) all included papers could be accessed completely and present data that could be analyzed accurately. Twelve observational studies of 2,144 patients were analyzed. The incidence of dyspareunia in postpartum mothers was not significantly different at 3 months after cesarean section and vaginal delivery (MD = 0.18; 95% CI = -0.19-0.54; p = 0.35), 6 months after cesarean section and vaginal delivery (MD = 0.43; 95% CI = -0.28-1.14; p = 0.23) and 12 months after cesarean section and vaginal delivery (MD = 0.12; 95% CI = -0 , 23-0.48; p = 0.50). The three studies are heterogeneous because I^2 is more than 50%. There was a tendency for lower dyspareunia rate to occur after 3 months, 6 months, and 12 months of postpartum after cesarean section than vaginal delivery although it did not differ significantly.

Keywords: cesarean section, cesarean delivery, vaginal birth, vaginal delivery, dyspareunia, FSFI

Introduction

In recent years, the number of cesarean bithshas increased worldwide. Approximately 30% of births in 2015 were cesarean births, which were almost three times the number of cesarean births in 1980, which was at 11% (Boerma, 2018). This figure is significantly above the WHO recommendation rate at 15-20% (WHO, 2015). In the US, for instance, the number of cesarean births in 2015 reached 32% of total births, of which 2.5% were cesarean delivery bymothers' request (ACOG, 2018). The birth rate in Italy was 33.7%, which makes Italy have the highest cesarean delivery rate in Europe (Masciullo, 2020).

The delivery process is associated with the incidence of postpartum dyspareunia. Dyspareunia is a genital pain disorder that adversely affects a woman's quality of life. This disorder occurs with a high prevalence and imposes a significant financial burden on women and the health care system (Sorensen, 2018). McDonald's cohort study (2015) stated that women who gave birth at 6 months through cesarean birth had fewer risk factors for dyspareunia than women who gave birth normally with an intact perineum (OR = 0.76). However, in 18-month postpartum, women with elective cesarean section had a greater risk factor for dyspareunia than women who delivered normally with an intact perineum (OR = 1.71) (McDonald, 2015). Mindset about delivery methods has changed due to the changing roles of women. Nowadays, women have greater autonomy rights and are career-oriented, and even some experience late marriages (Kaur, 2019). In addition to the revolutionized mindset, cesarean sectionis perceived to reduce the risk of pelvic floor injuries and maintain good sexual function (Souza, 2013). Therefore,it is considered a viable option even without medical indications or just bymothers' request known as Cesarean Section on Maternal Request (CSMR) (Masciullo, 2020). However, the research concluded that postpartum dyspareunia could still occur even though a woman underwent cesarean section.

Blomquist found women who experienced forceps delivery and those who gave birth to babies weighing more than 4 kgoften experienced dyspareunia more (Blomquist, 2014). Both Blomquist's and McDonald's research supports each other (Mc Donald, 2015). Constrastingly, Fauconnier's research on 1-year postpartum women stated that childbirth with tools treated episiotomy, and perineal trauma did not increase the risk of postpartum dyspareunia (Fauconnier, 2011). It goes the same way with Irwanto's research at Dr. SoetomoDistrict General Hospital in Indonesia, showing no significant difference in the female sexual function index scores in patients with cesarean section and vaginal delivery (Irwanto, 2016). This proves that even after vaginal delivery, the sexual function remains good.

Manresa conducted a meta-analysis study on dyspareuniato examine the incidence of perineal pain and dyspareunia after vaginal delivery. The study showed that women who underwent an episiotomy experienced moreincidence of perineal pain and dyspareunia (Manresa, 2019). The

second meta-analysis study conducted by Yang compared postpartum pelvic floor function after cesarean section to vaginal delivery. His research concluded that cesarean delivery could preferably maintain the pelvic floor function (Yang, 2019). Another meta-analysis study by Fan in Chinadiscovered no difference in sexual satisfaction among women after cesarean section and vaginal delivery; another finding showedthat there was a difference in the time to initiate postpartum intercourse after cesarean section and vaginal delivery (Fan, 2017).

The issues aforementioned were further investigated in the current research. Itaimed to comparethe dyspareunia rate according to female sexual function index scoresafter mothers had cesarean delivery and vaginal deliverywith various postpartum periods of 3 months, 6 months, and 12 months. Putting the variety of period could provide conclusive quantitative results through meta-analysis. This study could benefit healthcare providers to provide earlier detection of dyspareunia after mothers have undergone cesarean birth and vaginal delivery. Moreover, it becomes a educational reference for women about various childbirth problems such asdyspareunia.

Hypothesis: There are differences in dyspareunia rates after 3-month, 6-month, and 12-month cesarean and vaginal delivery according to female sexual function index scores (FSFI).

Methods

The meta-analysis study was conducted following the Preferred Reporting Items for Systematic reviews and Meta-analyzes (PRISMA) guide and the Cochrane Handbook for Systematic Reviews of Interventions. Articles under review were searched on some journal databases such as PubMed, Google Scholar, and the Cochrane Central Register of Controlled Trials. Articles selected should be randomized control trials and observational studies comparing dyspareunia ratesafter cesarean section and vaginal delivery according to female sexual function index (FSFI) scores. Journal article search was done using a combination of several terms, namely "Cesarean section", "Vaginal delivery", "Dyspareunia", and "FSFI". The research was conducted through some stages which were keyword determination/PICO identification, literature search based on PRISMA flowchart, literature analysis, statistical analysis, discussion, and conclusion. PICO identification in this study stood for Population (primiparous women), Intervention (elective cesarean section), Comparison (vaginal delivery, intact perineum, gr I-II perineal rupture, small episiotomy), and Outcome (dyspareunia after 3 months, 6 months, 12 months of postpartum after cesarean section and vaginal delivery). This meta-analysis study only involved case-control and cohort studies that examined dyspareunia ratesafter cesarean sectionand vaginal delivery according to the FSFI scores. The articles included should have examinedprimiparous patients who ever delivered normally with an intact perineum, grade I-II perineal rupture, or small episiotomy, as well as patients who ever

undergoneselective caesarean section. Besides, the articles should cover research conducted to patients after 3 months, 6 months, 12 months of postpartum after their labor. All included articles were completely accessible and had data that could be analyzed accurately. However, some exclusion criteria applied tostudies involving multiparous patients, patients with complicated vaginal delivery, gr III, or gr IV perineal ruptureand assistive devices such as vacuum or forceps, patients with emergency cesarean section, and the absence of assessment of dyspareunia using FSFI.

Assessment of study quality

The study quality assessment was carried out by the researchers independently. The validity of each study was assessed based on the criteria listed in the Cochrane Handbook for Systematic Reviews of Interventions. Discussion among the researchers was required when differences of opinionemerged. All of the studieswere grouped and assessed according to the quality categories:having a low risk of bias, a medium risk of bias, a high risk of bias. Data extraction was performed to achieve the goals and objectives, as well as to answer the research questions.

Statistical analysis

The clinical outcome analyzed was dyspareunia according to the FSFI scores in nominal data presented inMean Difference and Standard Deviation. The statistical analysis presenteddata extraction, effect size, homogeneity test, homogeneous fixed effect model or heterogeneous random effect model, summary effect, and forest plot. The combined statistical analysis and effect size meta-analysis were analyzed using the Review Manager (RevMan) software version 5.3. Then, the combined mean and Standard Deviation (SD) as well as 95% confidence intervals of the respective literature were calculated before the results were reported in identical scales. The heterogeneity between studies was assessed from the values of p and I2. P-value greater than 0.05 indicatesthe combined research was homogeneous. I2-valueequal to 0 suggests no variation was found in the combined research, and I^2 less than 50% means the combined research was homogeneous. When the data were homogeneous, analysis was carried out using a fixed-effect model. The opposite type of data was then analyzed using a random-effects model. Publication bias was further scrutinized using a funnel plot, which is an algorithm to assess the plot symmetry through plot ranking correlation and analysis.

Results

From the search on Pubmed, Google Scholar, and the Cochrane Central Register of Controlled Trials, 1,051 titles and abstracts were identified. Only one article that met the inclusion

criteria was available in the library of Dr. Soetomo General Academic Hospital in Indonesia. Not all of them went through analysis since there were 230 duplicate articles. After that, abstract screening was performed and resulted in 71 articles with the same PICO. The full-text articleswere checked to assess the quality of the study. A total of 4 articles were inaccessible, and 55 articles were unselected as they did not meet the inclusion critera. The excluded articles had questionnaires which did not use FSFI and werenot conducted in series of postpartum period. Moreover, theirdata did not meet the eligibility. Consequently, 12 articles met the inclusion criteria and were proceeded in the meta-analysis. Figure 1 shows the research flows starting fromm identification, inclusion, and exclusion, literature search, and reasons for exclusion.

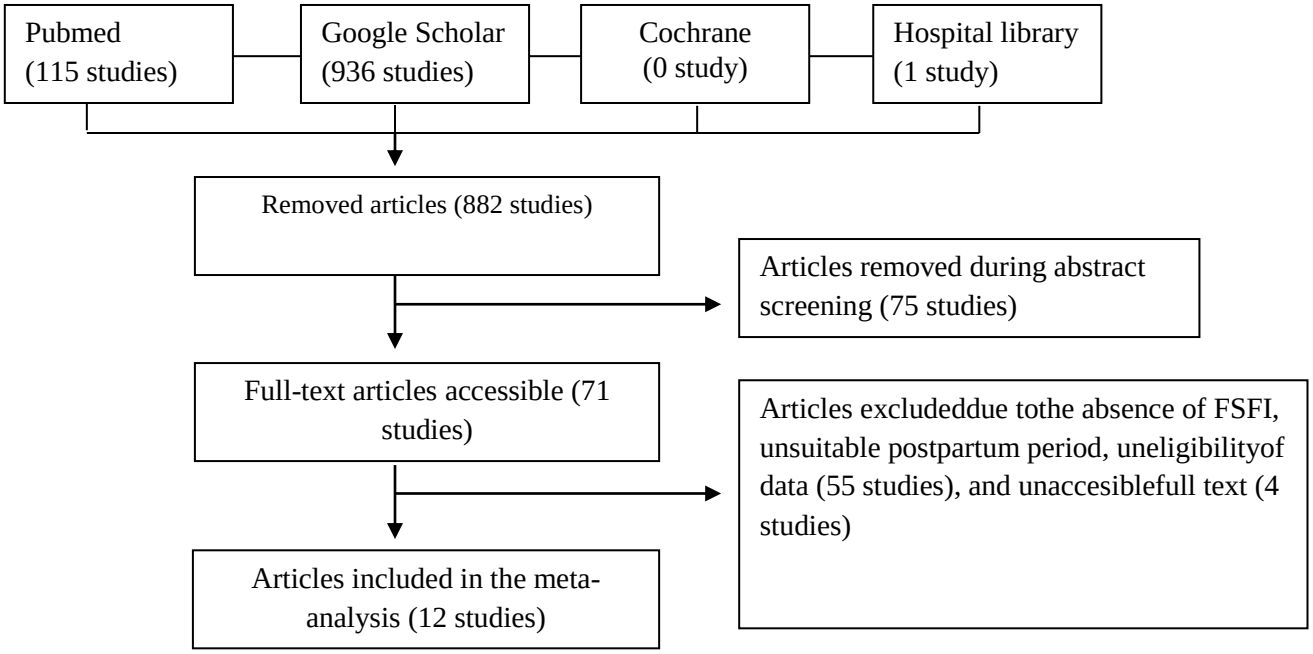


Figure 1. Flowchart of the article selection process

Characteristics of studies involvedare presented in Table 1, which contains the author's name, year of publication, research location, sample size, study design, intervention, and postpartum period. Articles were published in 2006 to 2019. The smallest sample size was 31 participants, and the largest was 450 participants. Overall, 1,029 women were identified to be in the cesarean section group, and 1,115 women were categorized asthe vaginal delivery group. The Risk of Bias In Non-randomized Studies-of Interventions (ROBINS-I) was employed to assess each study quality. The research assessment was different from that for Randomized Controlled Trial studysince it examined seven bias criteria due to confounding, selection of participants, classification of interventions, deviations from intended interventions, missing data, the measurement of outcomes, and the selection of the reported result. The assessment summarized that all the included studies had

a high risk of bias. High bias occuredin the confounding domain because most studies had confounderssuch as breastfeeding conditions and a history of dyspareunia prior to deliverythat could cause dyspareunia as well. High bias also occuredduring the selection of participantsas the the participants were grouped after the intervention. Besides, the measurement of outcomes might also be the reason for a high bias since the rater already knew the participantsin the intervention and control groups. Normally, a low bias might appear whenthe selection of participants is carried out blindly.

Table 1.Researchcharacteristics

Study	Year	Country	Study Design	Intervention	Sample Size (PA/PV)	Postpartum Period
Dabiri	2014	Iran	Cross-Sectional	Episiotomy with elective cesarean section	150 (69/81)	3,6
Lurie	2013	Israel	Cohort	Episiotomy with elective cesarean section	31 (17/14)	3,6
Irwanto S	2016	Indonesia	Cross-Sectional	Mediolateral episiotomy with elective cesarean section	60 (30/30)	3
Irwanto Y	2019	Indonesia	Cross-Sectional	Mediolateral episiotomy with elective cesarean section	90 (45/45)	3
Baksu	2006	Turki	Cohort	Mediolateral episiotomy with elective cesarean section	248 (92/132)	6
Barbara	2015	Italia	Cohort	Vaginal delivery (intact perineum, perineal laceration, episiotomy, and elective cesarean section)	224 (92/132)	6
Sayed	2017	Mesir	Cross-Sectional	Vaginal delivery (intact perineum, perineal laceration, episiotomy, and elective cesarean section)	277 (137/140)	6
Alesheikh	2016	Iran	Cross-Sectional	Vaginal delivery (intact perineum, perineal laceration, episiotomy, and elective cesarean section)	450 (225/225)	6
Saydam	2017	Turki	Cross-Sectional	Vaginal delivery (intact perineum, perineal laceration, episiotomy, and cesarean section)	142 (77/65)	6,12
Moghadam	2019	Iran	Cohort	Mediolateral episiotomy with elective cesarean section	107 (58/49)	6,12
Eid	2015	Mesir	Cohort	Episiotomy with elective cesarean section	200 (110/90)	3
Cai	2013	China	Case-Control	Episiotomy with elective cesarean section	165 (77/88)	12

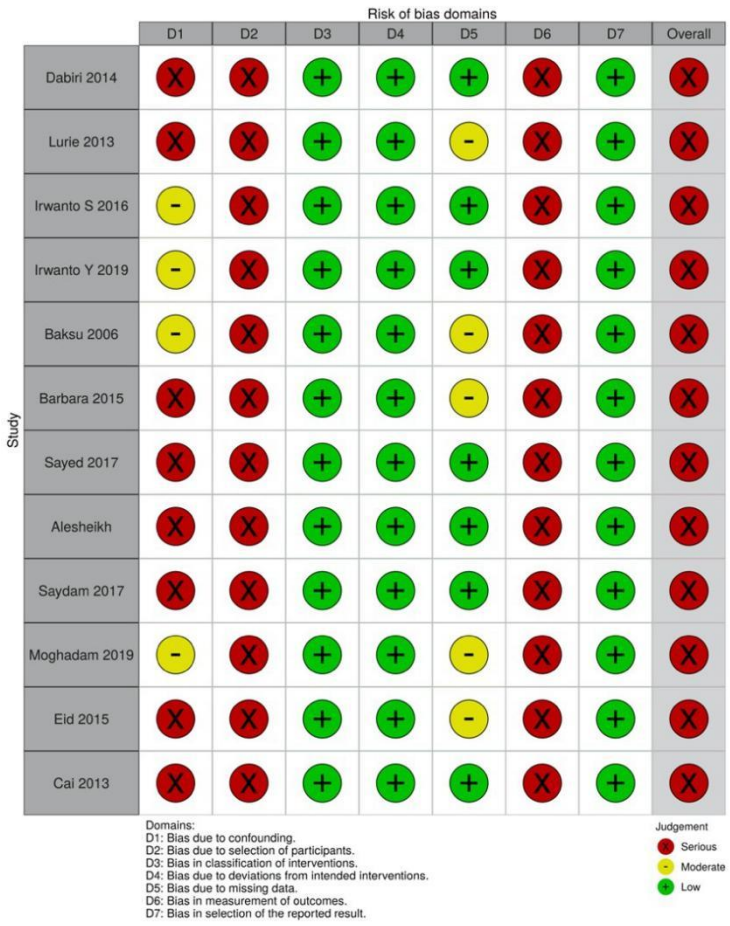


Figure 2. Bias risk assessment ofincluded studiesusingthe ROBINS-I assessment tool

Meta-analysis of 3-Month Postpartum

Five studies involved 531 samples (271 samples in the cesarean delivery group and 260 samples in the vaginal delivery group) (Figure 3). The results showed a I2-value of 62%indicates that the studies were heterogenous, and thus the random-effects model was used for analysis. The diamond intersected the confidence interval line and indicated that there was no statistically significant difference in dyspareunia rates after3 months of postpartum after cesarean delivery and vaginal delivery (MD = 0.18; 95%CI = -0.19-0.54; p = 0.35).

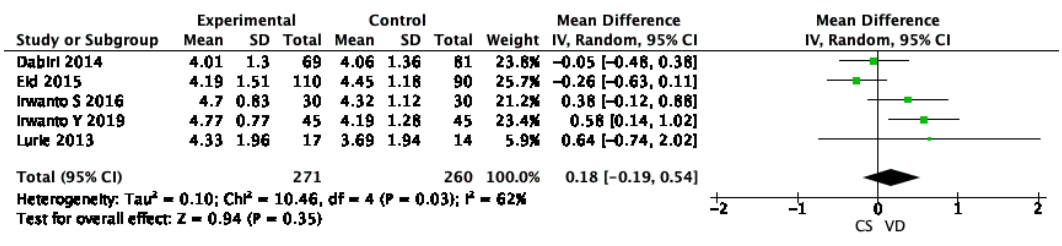


Figure 3. Forest plot of dyspareunia in 3-month postpartumaccording to FSFI scores.

Notes: SD: standard deviation; IV: inverse variance; CI: confidence interval; df: degrees of freedom

Meta-analysis of 6-Month Postpartum

Eight studies hada total of 1,548 samples (790 samples in the cesarean delivery group and 758 samples in the vaginal delivery group) (Figure 4). AI2 valueof 97% indicatedthat the studies were heterogenous and thus analyzed using the random-effects model. The study showed the diamond intersected the confidence interval line. There was no statistically significant difference in the dyspareunia rate in 6-monthpostpartum after cesarean delivery and vaginal delivery (MD = 0.43; 95%CI =-0.28-1.14; p = 0.23).

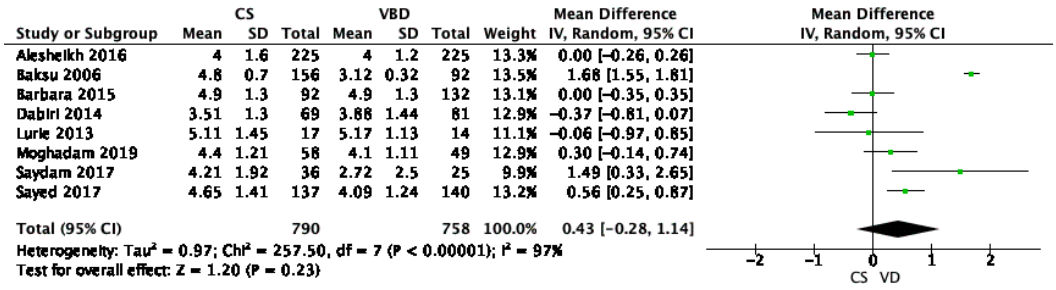


Figure 4. Forest plot of dyspareunia in 6-month postpartum according to FSFI scores.

Notes: SD: standard deviation; IV: inverse variance; CI: confidence interval; df: degrees of freedom

Meta-analysis of 12-Month Postpartum

Three studies reviewed possessed353 samples (176 samples in the cesarean delivery group and 177 samples in the vaginal delivery group) (see Fig. 5). AI2-value of 51% indicatedthat heterogeneity was found between the studies, and thusthe random-effects model was employed for analysis.The result demonstrated the diamond intersected the confidence interval line, and there was no statistically significant difference in dyspareunia ratesin 12-month postpartum after cesarean sectionand vaginal delivery(MD = 0.12; 95%CI =-0.23-0.4; p = 0.50).

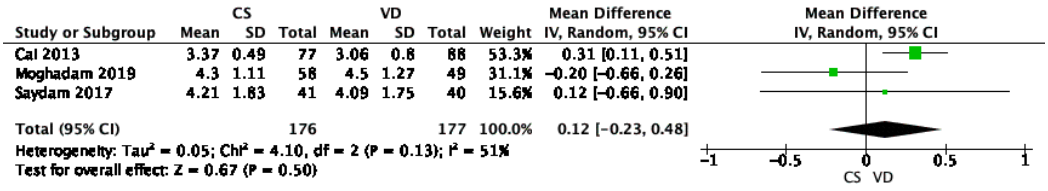


Figure 5.Forest plot of dyspareunia in 3-month postpartum according to FSFI scores.

Notes: SD: standard deviation; IV: inverse variance; CI: confidence interval; df: degrees of freedom

In the forest plot, the dyspareunia score in 6-month postpartum showed high heterogeneity with 97%I2. However, the studies obtained the same quality or weight (see Figure 5), and thus a sensitivity analysis was not performed.

Publication bias

In each 3-month, 6-month, and 12-month postpartum, there were only 5 studies, 8 studies, and 3 studies. The funnel plot ofdyspareunia in 3-month postpartum showed a fairly symmetrical picture, where there waslittle possibility of publication bias (Figure 6). While,in 6-month postpartum, it showed an asymmetrical picture, suggesting publication bias (Figure 7). Similar to the picture in 3-month postpartum, the funnel plot ofdyspareunia in 12-month postpartum was fairly symmetrical (Figure 8).

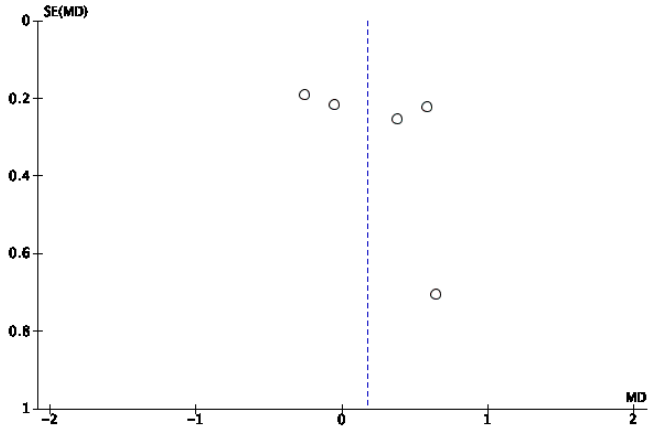


Figure 6. Funnel plot of dyspareunia in 3-month postpartumaccording to FSFI score.

Notes: SE:standard error; MD: mean difference

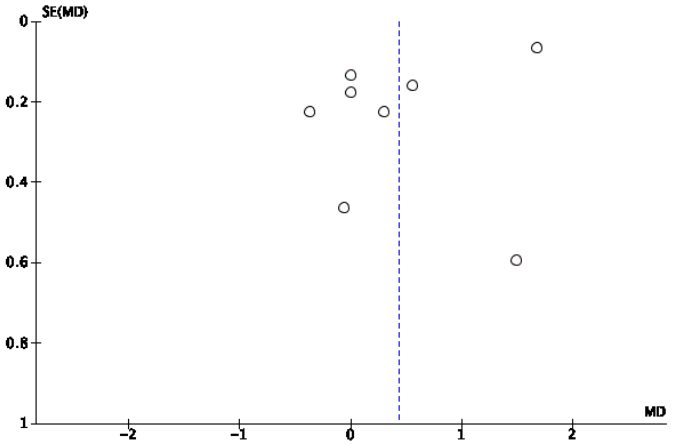


Figure 7. Funnel plot of dyspareunia in 6-month postpartum according to FSFI score.

Notes: SE:standard error; MD: mean difference

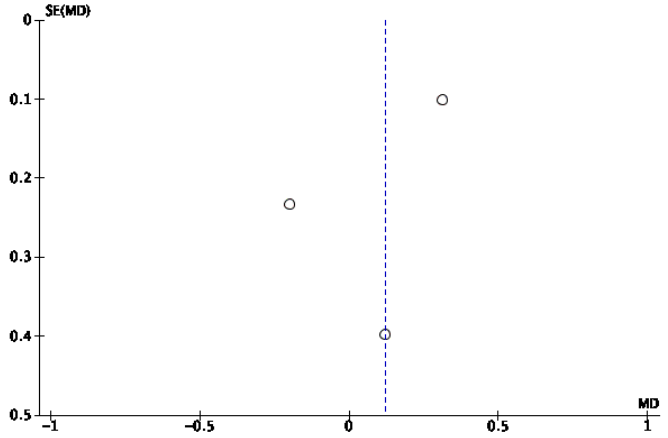


Figure 8. Funnel plot of dyspareunia in 12-month postpartum according to FSFI score.

Notes: SE:standard error; MD: mean difference

Discussion

The forest plot scores for dyspareunia in3-month postpartum highlighted that the diamond tilted more to the right, proving that the FSFI score was higher in cesarean section (MD = 0.18; 95%CI = 0.19-0.54; p = 0.35; I2 = 62%). In other words, casarean section could pose lower dyspareunia. However, the difference was not statistically significant in 3-month postpartum after cesarean section and vaginal delivery. The forest plot of dyspareunia rates in 6 months of postpartum illustrated that the diamond tilted more to the right, proving that the FSFI score was higher or lower dyspareunia was foundin cesarean section. The diamond intersected the vertical line, and there was no statistically significant difference in dyspareunia ratesin 6-month postpartum after cesarean section and vaginal (MD = 0.43; 95%CI = -0.28-1.14; p = 0.25; I2 = 97%). The heterogeneity between the studies was very

highat 97% due to different numbers of samples with the largest sample sizeof 450 samples in Alesheikh's study and the smallest of 31 samplesin Lurie's study. Besides, it can occur due to different patient characteristics, such as a socio-economic factor, age range, and level of education, as well as confounding factors including the absence of data on the type of episiotomy and skin incision in cesarean section. A research conducted by Alligood-Percoco NR, et al (2016) stated that as many as 21.2% of women reported dyspareunia at 6 months postpartum.

The forest plot of dyspareunia ratesin12 months of postpartum demonstrated that the diamond tilted more to the right. It means higher FSFI score in cesarean section indicated lower dyspareunia. However, there was no statistically significant difference in dyspareunia rates in 12-month postpartum after cesarean sectionand vaginal delivery (MD = 0.12; 95%CI = -0.23-0.48; p = 0.5; I2 = 51%). From the overall forest plots in different postpartum periods, it was summarized that there wasno significant difference between cesarean section and vaginal delivery. A similar study by Fan in China examined differences in postpartum sexual function aftercesarean section and vaginal delivery. The results found no difference in sexual satisfaction of women in 3 months and 6 months of postpartum (Fan, 2017).

Regarding the diamond leaning to the right, it was evident that the dyspareunia rate was higher in vaginal delivery than in cesarean section. The meta-analysis by Manresa reported that mothers undergoing vaginal delivery with an intact perineum could still experience dyspareunia, higher especially in women who went through perineal tear or episiotomy during labor (Manresa, 2019).

Even in elective cesarean section, there are still complaints of dyspareuniadue to breastfeeding factors, fatigue factors, or stress factors. A study on6-month postpartum concluded that among breastfeeding women (OR = 2.89;95%CI = 2.33-3.59), women who were exhausted (OR 1.60, 95% CI 1.30-1.98) and were in stressful conditions (OR 1.55, 95% CI 1.18-2.02) had a higher risk of dyspareunia (Alligood-Percoco, 2016). Besides,women with a surgical wound defect (niche) with adhesions after having caserean section were at risk of dyspareunia. A systematic review study in 2014 revealed that 18% of women with surgical wound defects (niche) complained of dyspareunia (Bij de Vaate AJ, et al 2014).

Cesarean sectioncould maintain the function of the woman's pelvic floor. A meta-analysis comparing cesarean sectionand vaginal delivery reported that pelvic floor muscle strength, vaginal muscle tension, and maximum urinary flow rate after cesarean sectionwere better than vaginal delivery (Yang, 2019). Although maternal characteristics at birth such as age or Body Mass Index (BMI) increase the risk of pelvic floor dysfunction pregnancy and delivery factors affect the pelvic floor anatomy and function (Urbankova, 2019).

A cesarean section, despite being performed electively, still carries a high risk of complications. A previous meta-analysis study showed that women who underwentcesarean delivery had a higher risk of death (OR = 3.10) and postpartum infection (OR = 2.83) (Mascarello, 2016). Other studies have shown that cesarean delivery poseda higher risk of hysterectomy (OR = 1.30), obstetric shock (OR = 2.54), and anesthetic complications (OR = 2.18) (Farchi, 2010). Obstetric shock includes bleeding shock, pulmonary embolism, amniotic fluid embolism, and sepsis (Habek, 2008).

From the above discussion, distinguished postpartum periodsin the research were aimed at reducing the time factor as a confounder. However, there werestill some limitations in this study. First, the results might be influenced by many other confounding variables, such as the absence of data on the type of episiotomy in several studies andtype of abdominal incision in cesarean section, breastfeeding status, and a history of previous dyspareunia. As a result, the data obtained had high heterogeneity. Second, this current study implied a fairly high bias because the selection of the subjects was not done blindly. The future research could use randomized controlled trials design with a blind subject selection to reduce the research bias.

Conclusion

In all 3 months, 6 months, and 12 months of postpartum, the dyspareunia rate was likelylower in cesarean section although the difference was not statistically significant. Further meta-analysis studies need to evaluate other indicators compared between cesarean sectionand vaginal delivery. More studies, especially RCTs, can be included for possible further meta-analyses. It is important to inform pregnant women that vaginal delivery is not a major contributing factorto sexual dysfunction. Importantly, cesarean section should only be undertaken when there are medical indications for both mother and the fetus.

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Comparison of dyspareunia using female sexual index score at 3 months, 6 months and 12 mont hs post vaginal and caesarean delivery: Meta-an alysis

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Conflict of Interest

The authors declare no conflict of interest

Author contributions:

EMK : develop ideas and analysis data, ZMP : collecting and processing data, HP : finishing data and manuscript preparation

Comparison of dyspareunia using female sexual index score at 3 months, 6 months and 12 months post vaginal and caesarean delivery: Meta-analysis

Abstract

Background: The cesarean delivery rate has been increasing all over the world over the last few years. There is a change in mindset due to the change in women's role, let alone the perception stating that cesarean delivery can decrease the risk of having pelvic floor dysfunction and maintain the sexual functions. Therefore, women think that cesarean delivery is a good choice for delivery, even it has no indications. This study aimed at analyzing and providing quantitative data by comparing the dyspareunia based on FSFI scores between cesarean section and vaginal delivery.

Method: The systematic data search was done in the Medical Database (PUBMED, *Google Scholar*, *Cochrane*) and the archives of RSUD Dr. Soetomo. The inclusion criteria consisted of (1) observational study with the following keywords *"cesarean section"*, *"cesarean delivery"*, *"vaginal birth"*, *"vaginal delivery"*, *"dyspareunia"*, *"FSFI"*, (2) all included papers could be accessed completely, and the data that had been obtained could be analyzed accurately.

Result: Twelve observational studies toward 2,144 patients had been analyzed. The dyspareunia score after 3 months of delivery between cesarean section and vaginal delivery had a *Mean Difference* (MD) of 0.18 and 95% CI of -0.19 to 0.54 (P-value of 0.35). The dyspareunia score after 6 months of delivery between cesarean section and vaginal delivery had a *Mean Difference* (MD) of 0.43 and 95% CI of -0.28 to 1.14 (P-value of 0.23). Meanwhile, the dyspareunia score after 12 months of delivery between cesarean section and vaginal delivery had a *Mean Difference* (MD) of 0.12 and 95% CI of -0.23 to 0.48 (P-value of 0.50). From those three forest plots, all diamonds were tangent to the vertical line *(no effect)* and had a $p>0.05$, so it could be inferred that no significant statistical difference was found between the experimental group (cesarean section) and the control group (vaginal delivery). Those three studies were heterogeneous since I^2 was more than 50%.

Conclusion: This meta-analysis concludes that there is a tendency for 3 month, 6 month, and 12 months of post delivery dypareunia rate to be lower in cesarean section than vaginal delivery, but it's not staistically significant.

Keywords: Cesarean section, cesarean delivery, vaginal birth, vaginal delivery, dyspareunia, FSFI

Introduction

In recent years, the number of caesarean deliveries has increased worldwide. Approximately 30% of births in 2015 were caesarean deliveries, which is almost three times the number of caesarean deliveries in 1980, which was 11% (Boerma, 2018). This figure is significantly above the WHO recommendation rate, which is 15-20% (WHO, 2015). The number of caesarean delivery in the US in 2015 reached 32% of total births, of which 2.5% were caesarean delivery at the request of the mother (ACOG, 2018). The birth rate in Italy is 33.7%, which makes Italy the country in Europe that has the highest caesarean delivery rate (Masciullo, 2020).

The delivery process is associated with the incidence of post partum dyspareunia. Dyspareunia is a genital pain disorder that adversely affects a woman's quality of life. This disorder occurs with a high prevalence and imposes a significant financial burden on women and the health care system (Sorensen, 2018). McDonald's cohort study (2015) stated that women who gave birth at 6 months using caesarean delivery had less risk factors for dyspareunia than women who delivered vaginally with an intact perineum (OR 0.76). However, at 18 months postpartum, women with elective caesarean delivery had a greater risk factor for dyspareunia than women who delivered vaginally with intact perineum (OR 1.71) (McDonald, 2015). There is a change in mindset due to the changing roles of women. Where women currently have greater autonomy rights, have career orientation, and some experience late marriages (Kaur, 2019). Plus the assumption that caesarean delivery can reduce the risk of pelvic floor injuries and maintain good sexual function (Souza, 2013). Therefore women think that caesarean delivery is a viable option for delivery, even without indication, which is referred to as CSMR (Cesarean Section on Maternal Request) (Masciullo, 2020). However, from the McDonald research above, it was concluded that postpartum dyspareunia could still occur even though a woman underwent caesarean delivery.

Blomquist in 2014 conducted a study on women after vaginal delivery, women who experienced forceps delivery and those who gave birth to babies weighing more than 4 kg, more often experienced dyspareunia (Blomquist, 2014). The results of McDonald's research on women after 6 months of childbirth also support this (Mc Donald, 2015). In contrast to Fauconnier's research in 2011. His research on 1 year postpartum women, stated that childbirth with tools, episiotomy, and perineal trauma did not increase the risk of postpartum dyspareunia (Fauconnier, 2011). Likewise with Irwanto's research in 2016 at Dr. Soetomo General-Academic Hospital in Indonesia, who stated that there was no significant difference in the female sexual function index score in patients with caesarean and vaginal delivery (Irwanto, 2016). This proves that even during vaginal delivery, sexual function remains good.

For a meta-analysis of dyspareunia, Manresa in 2019 examined the incidence of perineal pain and dyspareunia after vaginal delivery. The results of his study showed that the incidence of

perineal pain and dyspareunia was more in women who underwent an episiotomy (Manresa, 2019). The second meta-analysis study conducted by Yang in 2019, compared caesarean and vaginal delivery with postpartum pelvic floor function, concluded that caesarean delivery was preferred to maintain pelvic floor function (Yang, 2019). Another meta-analysis study by Fan in 2017 which was specifically conducted in China, concluded that there was no difference in sexual satisfaction among women after caesarean delivery and vaginal delivery, and that there was a difference in the time to initiate postpartum intercourse between the 2 methods of delivery (Fan, 2017). .

Based on this background, the aim of the study was to determine the comparison of dyspareunia according to female sexual function index score between post caesarean delivery and vaginal delivery, which were divided based on postpartum months, namely 3 months, 6 months, and 12 months with the hope that the results of this study can provide a conclusions quantitative through meta-analysis. This study provides the benefit of studying the impact of caesarean and vaginal delivery on the occurrence of dyspareunia in health care providers and is a reference for educating women about the various problems caused by childbirth that can cause dyspareunia.

Hypothesis: There are differences in dyspareunia according to the 3-month, 6-month, and 12-month female sexual function index scores between caesarean and vaginal delivery.

Methods

The meta-analysis study was conducted using the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-analyzes) guide and the Cochrane Handbook for Systematic Reviews of Interventions. Systematic journal searched using PubMed, Google scholar, and the Cochrane Central Register of Controlled Trials to obtain articles from randomized control trials and observational studies examining comparisons of dyspareunia according to female sexual function index (FSFI) scores between post-caesarean and vaginal delivery. Journals search uses a combination of several terms, namely "Cesarean section", "Vaginal delivery", "Dyspareunia", and "FSFI". The research flow is keyword determination / PICO identification, literature search based on PRISMA Flowchart, literature analysis and statistical analysis, discussion and conclusion. PICO identification in this study is P / Population (primiparous women), I / Intervention (elective caesarean section), C / Comparison (vaginal delivery; intact perineum, gr I-II perineal rupture, small episiotomy) and O / Outcome (post-dyspareunia 3 months, 6 months, 12 months). Inclusion criteria in this study were case control and cohort that examined dyspareunia according to the FSFI score between postpartum caesarean delivery and vaginal delivery, the population of patients with vaginal delivery were primiparous patients with a history of labor with intact perineum, grade I-II perineal rupture, or small episiotomy where the patient Caesarean section is a patient who underwent

elective surgery, the study was conducted in the postpartum population of 3 months, 6 months, 12 months, all included articles were completely accessible and the data obtained could be analyzed accurately. Studies involving multiparous patients, patients with complicated vaginal delivery, gr III or gr IV perineal rupture and patients undergoing vaginal delivery by performing assistive devices, namely vacuum or forceps, patients with emergency cesarean section, assessment of dyspareunia who did not use FSFI were not included in the meta analysis.

Assessment of study quality

The study quality assessment was carried out by the authors of 3 independently assessing the validity of each study using the criteria listed in the Cochrane Handbook for Systematic Reviews of Interventions. The author is there to discuss if there are differences of opinion. Each study was grouped and assessed according to the quality category: A, the study has a low risk of bias; B, study has a medium risk of bias, or C, study has a high risk of bias. Data extraction was carried out to get the goals, objectives and research questions of this study.

Statistical analysis

The clinical outcome analyzed was dyspareunia on the FSFI score, with nominal data namely Mean Difference and Standard Deviation. The flow of statistical analysis includes: data extraction, effect size, homogeneity test, homogeneous fixed effect model or heterogeneous random effect model, summary effect and forest plot. The combined statistical analysis and effect size meta-analysis were analyzed using the Review Manager (RevMan) software version 5.3. We calculated the combined mean and standard deviation (SD) and 95% confidence intervals from comparative analyzes of the respective literature and used when the results reported were using identical scales. All data were analyzed and calculated using the RevMan software version 5.3. With the confidence interval number used is 95%. The heterogeneity between studies was assessed from the results of p and I2. If $p > 0.05$, the combined research is said to be homogeneous. If $I2 = 0$ there is no variation, $I2 < 50\%$ is said to be homogeneous. If the data is homogeneous, analysis is carried out using a fixed effect model, if the data is heterogeneous, random effects model analysis is used. Researchers evaluated publication bias by using a funnel plot, which is an algorithm that assesses the symmetry of the funnel plot, through ranking correlation and analysis of the research plot.

Results

Based on Pubmed database, Google scholar, and the Cochrane Central Register of Controlled Trials, it was found that 1051 journal titles and abstracts were related to the search keywords. The keywords used are “cesarean section”, “cesarean delivery”, “vaginal birth”,

"vaginal delivery", "dyspareunia", "FSFI". Obtained 1 journal that entered the inclusion criteria from the library of Dr. Soetomo General-Academic Hospital in Indonesia. Therefore we get a total of 1052 journals. There were 230 journal duplications. After that the authors screened the abstract and found that 71 journals had the same PICO. Then the authors evaluate the journal in full text to assess the quality of the study. A total of 4 journals were inaccessible and 55 journals were excluded according to the exclusion criteria that the author set, namely questionnaires that did not use FSFI, the study was conducted not according to the month determined by the researcher, and data that did not meet the eligibility. There were 12 studies that met the criteria for inclusion in the meta-analysis. Figure 1 shows the flow regarding identification, inclusion and exclusion, the process of searching for journals, and reasons for exclusion.

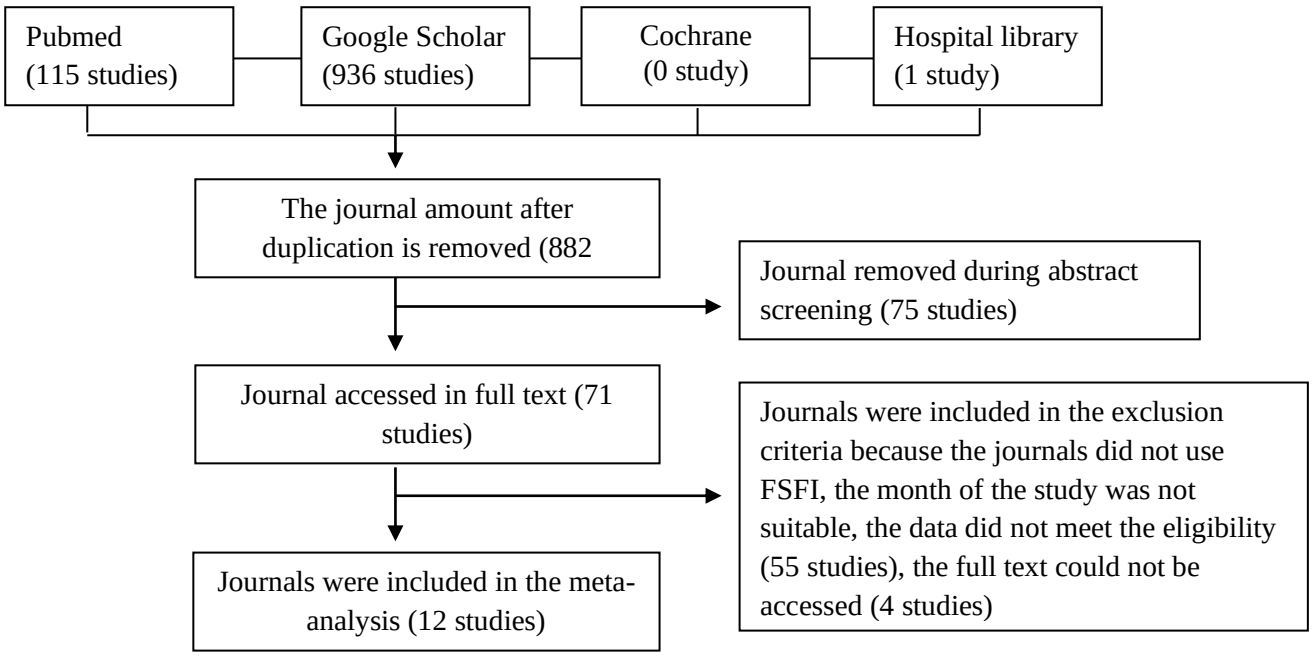

Figure 1. Flowchart of the study selection process

Study characteristics can be seen in table 1, which contains the author's name, year of publication, country of author, sample size, study design, intervention and time after delivery. Articles were published in the range 2006 to 2019. Sample sizes varied, with the smallest sample being 31 and the largest being 450, with a total of 1029 women in the caesarean delivery group and 1115 women in the vaginal delivery group. The assessment of study quality used the Risk Of Bias In Non-randomized Studies-of Interventions (ROBINS-I) assessment tool. This assessment is different from the assessment in the Randomized Controlled Trial study. There are 7 bias criteria in this table, consisting of bias due to confounding, bias due to selection of participants, bias in classification of interventions, bias due to deviations from intended interventions, bias due to

missing data, bias in measurement of outcomes, bias in selection of the reported result. From the table below, it can be concluded that all the included studies had a high risk of bias. High bias occurs in the confounding domain because in most studies it is found that confounders can cause dyspareunia as well, such as breastfeeding conditions and a history of dyspareunia before delivery. High bias also occurs in the domain selection of participants, because in the included studies, participants were divided after the intervention was carried out. In the domain of measurement of outcomes, there is also a high bias, because the outcome rater already knows the participant group, between intervention and control. It is said that the risk is low if blinding is carried out, so that the outcome assessor does not know the group of each participant.

Table 1. Study characteristics

Study	Year	Country	Study Design	Intervention	Sampel size (PA/PV)	Time after delivery
Dabiri	2014	Iran	Cross Sectional	Episiotomy with elective caesarean section	150 (69/81)	3,6
Lurie	2013	Israel	Cohort	Episiotomy with elective caesarean section	31 (17/14)	3,6
Irwanto S	2016	Indonesia	Cross Sectional	Mediolateral episiotomy with elective cesarean section	60 (30/30)	3
Irwanto Y	2019	Indonesia	Cross Sectional	Mediolateral episiotomy with elective cesarean section	90 (45/45)	3
Baksu	2006	Turki	Cohort	Mediolateral episiotomy with elective cesarean section	248 (92/132)	6
Barbara	2015	Italia	Cohort	Vaginal delivery (intact perineum, perineal laceration, episiotomy and elective cesarean section)	224 (92/132)	6
Sayed	2017	Mesir	Cross Sectional	Vaginal delivery (intact perineum, perineal laceration, episiotomy and elective cesarean section)	277 (137/140)	6
Alesheikh	2016	Iran	Cross Sectional	Vaginal delivery (intact perineum, perineal laceration, episiotomy and elective cesarean section)	450 (225/225)	6
Saydam	2017	Turki	Cross Sectional	Vaginal delivery (intact perineum, perineal laceration, episiotomy and cesarean section)	142 (77/65)	6,12
Moghadam	2019	Iran	Cohort	Mediolateral episiotomy with elective cesarean section	107 (58/49)	6,12
Eid	2015	Mesir	Cohort	Episiotomy with elective caesarean section	200 (110/90)	3
Cai	2013	China	Case Control	Episiotomy with elective caesarean section	165 (77/88)	12

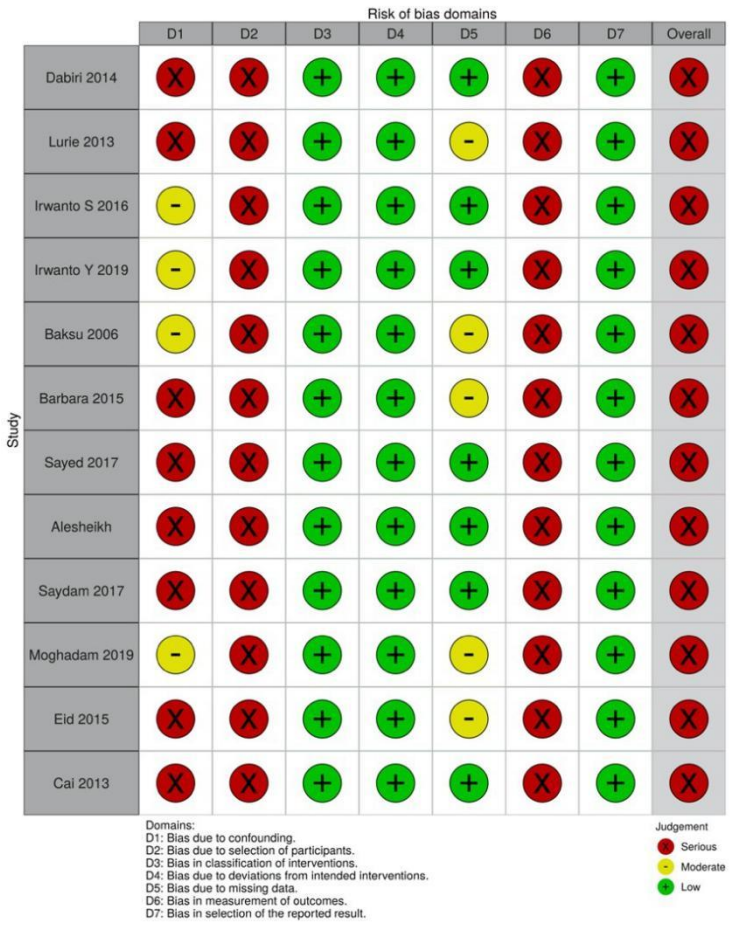

Figure 2. Bias risk assessment for each of the included articles using the ROBINS-I assessment tool

3-month meta-analysis

Five studies totaling 531 samples (271 samples in the caesarean delivery group and 260 samples in the vaginal delivery group) (Figure 3). 62% I2 result indicates that heterogeneity is found between studies, so the analysis used is the random-effects model. The combined mean difference was 0.18, and the 95% CI was - 0.19 to 0.54 (P 0.35). Because P> 0.05 and diamond intersected the confidence interval line, the results of this analysis showed that there was no statistically significant difference in dyspareunia according to the FSFI score between caesarean delivery and vaginal delivery at 3 months postpartum.

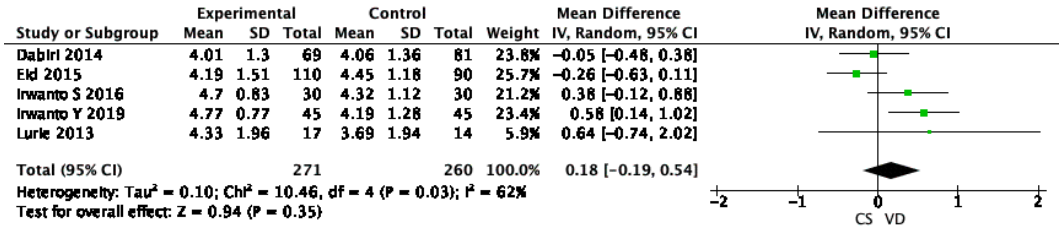

Figure 3. Forest plot of dyspareunia according to FSFI score 3 months postpartum. SD: standard deviation; IV: inverse variance; CI: confidence interval; df: degress of freedom

6-month meta-analysis Eight studies with a total of 1548 samples (790 samples in the caesarean delivery group and 758 samples in the vaginal delivery group) (Figure 4). The I2 result of 97% indicates that heterogeneity is found between studies, so the analysis used is the random-effects model. The combined mean difference was 0.43, and the 95% CI was - 0.28 to 1.14 (P 0.23). Because P> 0.05 and diamond intersected the confidence interval line, the results of this analysis indicated that there was no statistically significant difference in the mean dyspareunia according to the FSFI score between caesarean delivery and vaginal delivery at 6 months postpartum.

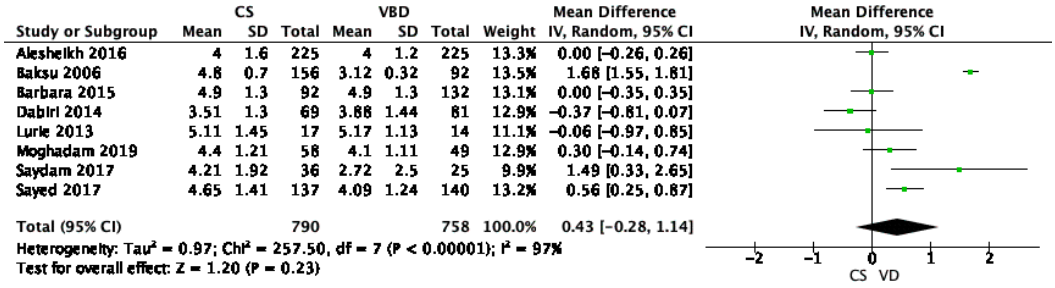

Figure 4 Forest plot of dyspareunia according to FSFI score 6 months postpartum. SD: standard deviation; IV: inverse variance; CI: confidence interval; df: degress of freedom

12-month meta-analysis

Three studies totaling 353 samples (176 samples in the caesarean delivery group and 177 samples in the vaginal delivery group) (Fig. 5). The I2 result of 51% indicates that heterogeneity is found between studies, so the analysis used is the random-effects model. The combined mean difference

was 0.12, and the 95% CI was - 0.23 to 0.48 (P 0.50). Since P> 0.05 and diamond intersected the confidence interval line, the results of this analysis showed that there was no statistically significant difference in dyspareunia according to FSFI score between caesarean delivery and vaginal delivery at 12 months postpartum.

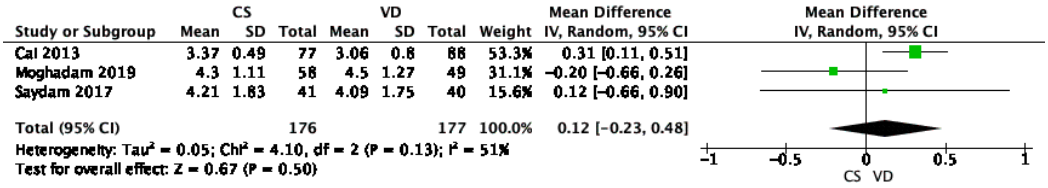

Figure 5 Forest plot of dyspareunia according to FSFI score 12 months postpartum. SD: standard deviation; IV: inverse variance; CI: confidence interval; df: degress of freedom

In the forest plot the dyspareunia score 6 months postpartum showed high heterogeneity with I2 97%. However, the included studies obtained the same quality or weight, it can be seen in Figure 5, so we did not do a sensitivity analysis.

Publication bias

In the postpartum dyspareunia score test at 3 months there were only 5 studies, in the 6 months postpartum dyspareunia score test there were only 8 studies, and in the 12 months postpartum dyspareunia score test only 3 studies were obtained. The funnel plot in dyspareunia according to the FSFI score 3 months post shows a fairly symmetrical picture, where there is little possibility of publication bias (Figure 6). The funnel plot in dyspareunia according to the FSFI score 6 months postpartum showed asymmetrical features, suggesting publication bias (Figure 7). The funnel plot in dyspareunia according to the FSFI score 12 months postpartum shows a fairly symmetrical picture (Figure 8).

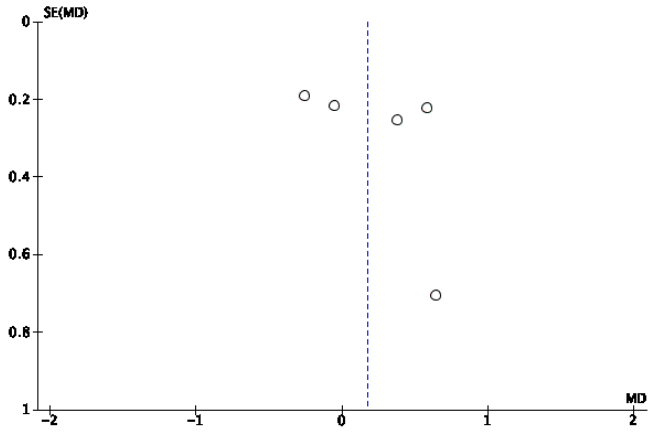

Figure 6 Funnel plot of dyspareunia according to FSFI score 3 months postpartum. SE: standard error; MD: mean difference

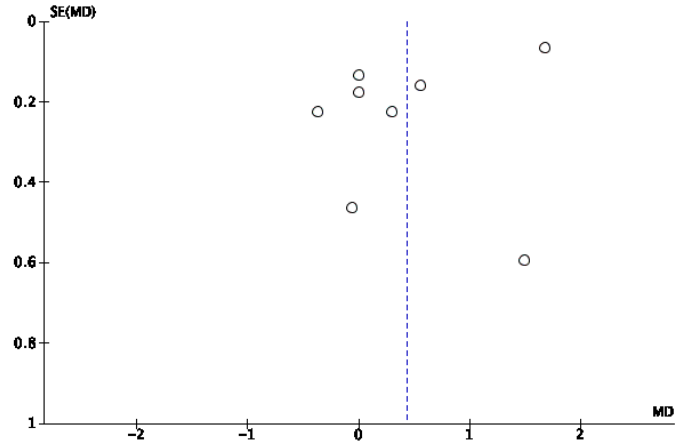

Figure 7 Funnel plot of dyspareunia according to FSFI score 6 months postpartum. SE: standard error; MD: mean difference

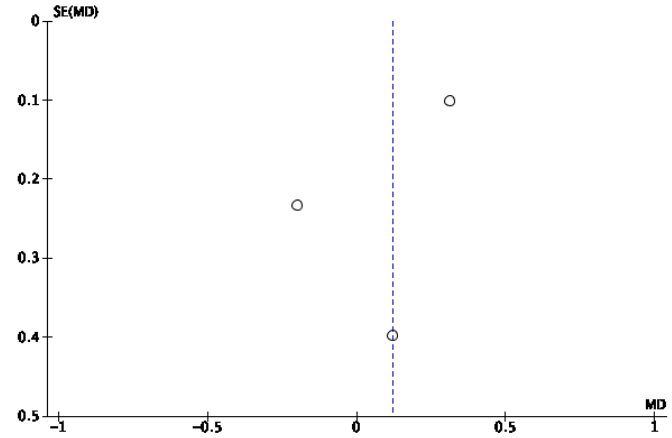

Figure 8 Funnel plot of dyspareunia according to FSFI score 12 months postpartum. SE: standard error; MD: mean difference

Discussion

The results of the forest plot score for dyspareunia at 3 months postpartum obtained MD 0.18, 95% CI -0.19 to 0.54, p = 0.35, I2 = 62%. Diamond tilted more to the right, proving that the FSFI score was higher in caesarean deliveries. A higher FSFI score means lower dyspareunia. However, because diamond crossed the vertical line and p> 0.05, there was no statistically significant difference in the dyspareunia score between caesarean delivery and vaginal delivery at 3 months postpartum. The results of the forest plot dyspareunia score at 6 months postpartum obtained MD 0.43, 95% CI -0.28 to 1.14, p = 0.25, I2 = 97%. Diamond tilted more to the right, proving that the FSFI score was higher in caesarean deliveries. A higher FSFI score means lower dyspareunia. However, because diamond intersected the vertical line and p> 0.05, there was no statistically significant difference in the dyspareunia score between caesarean delivery and vaginal delivery at 6 months postpartum. The heterogeneity between studies at month 6 is very high, namely 97%, it can be caused by the difference in the number of samples that are quite far between studies, with the largest sample size in Alesheikh's study of 450 samples, and the smallest number of samples in Lurie's study of 31 samples. In addition, heterogeneity can occur due to different patient characteristics, for example from a socio-economic perspective, age range, and level of education.As well as confounding factors, such as the absence of data on the type of episiotomy and the type of skin skin incision in caesarean delivery.

The results of forest plot dyspareunia scores at 12 months postpartum obtained MD 0.12, 95% CI -0.23 to 0.48, p = 0.5, I2 = 51%. Diamond tilted more to the right, proving that the FSFI score was higher in caesarean deliveries. A higher FSFI score means lower dyspareunia. However, because diamond intersected the vertical line and p> 0.05, there was no statistically significant difference in the dyspareunia score between caeasarean delivery and vaginal delivery at 12 months postpartum. When compared between the 3rd (representing short-term), 6th, and 12th (representing long-term) postpartum months, the three forest plot results together produce the conclusion that there is no significant difference between caesarean and vaginal delivery. A similar study by Fan in 2017 in China examined differences in postpartum sexual function between caesarean and vaginal delivery. The results found no difference in sexual satisfaction in women at 3 months and 6 months of post partum. Sexual satisfaction includes dyspareunia options in it (Fan, 2017).

Regarding the right-leaning diamond, it is evident that the dyspareunia rate is higher in vaginal deliveries than caesarean deliveries. The meta-analysis by Manresa reports that vaginal delivery with intact perineum can still experience dyspareunia, with a higher incidence rate in women who experience perineal tear or episiotomy during labor (Manresa, 2019).

Even in elective caesarean delivery, there are still complaints of dyspareunia. Some of the causes are breastfeeding factors, fatigue factors, stress factors. A study conducted 6 months postpartum concluded that among women who were breastfeeding (OR 2.89, 95% CI 2.33-3.59), women were exhausted (OR 1.60, 95% CI 1.30-1.98) , and women in stressful conditions (OR 1.55, 95% CI 1.18-2.02) had a higher risk of dyspareunia (Alligood-Percoco, 2016). In addition, in women after caesarean delivery, if there is a surgical wound defect (niche) with adhesions, there is a risk of developing dyspareunia. In a systematic review study in 2014, it was found that 18% of women with surgical wound defects (niche) complained of dyspareunia (Bij de Vaate, 2014).

One of the advantages of caesarean delivery is that it maintains the function of the woman's pelvic floor. A meta-analysis comparing caesarean delivery and vaginal delivery, reported that pelvic floor muscle strength, vaginal muscle tension, and maximum urinary flow rate in women after caesarean delivery were better than vaginal delivery (Yang, 2019). Although maternal characteristics at birth such as age or BMI increase the risk of PFD, labor and birth factors play an equally important role in pelvic floor anatomy and function (Urbankova, 2019).

A caesarean delivery, although performed electively, still carries a high risk of complications. Mascarello's meta-analysis study in 2016 showed that women with caesarean delivery had a higher risk of death (OR 3.10) and postpartum infection (OR 2.83) (Mascarello, 2016). Other studies have shown that caesarean delivery has a higher risk of hysterectomy (OR 1.30), obstetric shock (OR 2.54), and anesthetic complications (OR 2.18) (Farchi, 2010). Obstetric shock includes bleeding shock, pulmonary embolism, amniotic fluid embolism, sepsis (Habek, 2008).

From the above discussion, the authors distinguished postpartum time to reduce the time factor as a confounder. However, there are still some limitations in this study. First, there are many other variables that can confound data, such as the absence of data on the type of episiotomy in several studies, no data on the type of abdominal incision in caesarean delivery, breastfeeding status, and a history of previous dyspareunia. So that the data between studies obtained high heterogeneity. Second, in the study we found, there was a fairly high bias because there was no blinding from the research subjects and from the researchers themselves, so it is hoped that in the future there will be randomized controlled trials studies that discuss this topic to reduce research bias.

Conclusion

There was a tendency for dyspareunia rates at 3 months, 6 months and 12 months postpartum to be lower in caesarean delivery, but it was not statistically significant. Further research needs to be conducted a meta-analysis to evaluate other indicators that can compare between caesarean delivery

and vaginal delivery. More studies can be included, especially RCTs, for possible meta-analyzes in future studies. It is important to inform pregnant women that vaginal delivery is not a major factor in sexual dysfunction. Caesarean delivery should only be undertaken when there are medical indications for both the mother and the fetus.

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