

Peer Review File

Article information: <https://dx.doi.org/10.21037/jtd-23-1733>

Reviewer A

1) For the first whole paragraph of the results section: that is describing more of methods and intro and should be moved to the methods section. The results should just be the results not another description of the intro and methods.

Reply: Thank you for your review. We have carefully reviewed the first paragraph of the results section and acknowledge your observation. We have now moved the descriptive content more appropriate for the methods section. This adjustment ensures that the results section focuses strictly on the outcomes of our study without overlapping with the introduction or methods.

Changes in the text: page 4

2) For the section on postop PFTs increases with respiratory training increases in 1 to 2% can't really be clinically relevant, did these same studies show an increase in QOL associated with the 1 to 2% increase in FEV and FVC or was the QOL studies separate than the increase in PFTS postop studies?

Reply: In response to your feedback, we have made the following modifications to the results section:

When discussing the impact of breathing exercises on postoperative lung cancer patients' pulmonary function test (PFT) metrics and quality of life (QOL), we noted that a 1 to 2% increase in postoperative PFTs may seem clinically insignificant. However, from the data we collected, breathing exercises not only facilitated a slight improvement in FVC% and FEV1%, at 1.73% and 2.15% respectively, but more importantly, these enhancements in lung function metrics were accompanied by a significant improvement in patients' quality of life. The reduction in anxiety and depression scores, at 3.42 and 2.14 respectively, along with changes in daily physical activity patterns, such as increased sedentary time and enhanced light physical activity time, reflect an overall improvement in quality of life. Additionally, increases in MVV and MIP values, at 7.58 L/min and 0.95 cmH₂O respectively, further demonstrate the effectiveness of breathing exercises in

postoperative recovery. While these improvements are statistically significant, we must also acknowledge the limitations of our study, especially the lack of long-term follow-up data in most research, which limits our understanding of the long-term effects of breathing exercises.

In summary, although the increase in PFTs may not be significant in numerical terms, the associated improvements in quality of life indicators highlight the important value of breathing exercises in postoperative rehabilitation. We have discussed this finding and its potential impact on patient recovery more comprehensively in the revised manuscript.

Changes in the text: page 8

3) The data on improved QOL was a little minimal to me, i think the conclusion that respiratory training improves QOL and helps patients out clinically postoperatively is a stretch, given the limited data, I would probably tone down the conclusion.

Reply: We have taken your feedback into consideration and reevaluated the conclusion regarding the improvement in QOL postoperatively through respiratory training. We have toned down the claims to better reflect the evidence presented, indicating that while there are positive trends, the data on improved QOL is indeed minimal and warrants further investigation.

Changes in the text: page 2-abstract

Reviewer B

This paper is well written and the topic is interesting, however statistics used in this manuscript should be checked by a professional statistician. The outcome of this study was not positive, but this paper is worth being published in JTD. There are several points to be revised, as follows:

1) The conclusion of the text should be shortened.

Reply: Thank you for your review. In response to your suggestion, we have shortened the conclusion of our manuscript. We have made it more concise, directly reflecting the core findings and implications of our study without overextending the interpretations of the results.

Changes in the text: page 2-abstract

2) In the Results section, there are several sentences with discussion citing references. Such sentences should be moved to the Discussion section. Please revise the manuscript in this point.

Reply: We have reviewed the Results section and identified the sentences that inadvertently blended discussion elements with the presentation of findings. These sentences have been carefully moved to the Discussion section to maintain a clear distinction between the presentation of results and their interpretation. This revision ensures that each section of the manuscript adheres to its intended purpose, with results being distinctly reported and discussed in the appropriate sections.

Changes in the text: page 11-discussion

Reviewer C

I thank the editor for allowing me to review this metaanalysis focusing on the efficacy of respiratory muscle training or breathing exercises on lung function and quality of life in patients with postoperative lung cancer.

The design of this systematic review must first be truly stated. The author presents a meta-analysis but certain results announced clearly appear to correspond to a qualitative review.

Reply: Thank you for highlighting the need for clarity between the meta-analytic and qualitative components of our study. We have now explicitly delineated the sections to reflect the systematic review's design accurately, ensuring a clear distinction between the quantitative meta-analysis and the qualitative review within the manuscript.

Changes in the text: page 4-Introduction

Second, the intervention being evaluated must be specified. Indeed, the author selected trials performing breathing exercises, respiratory training or pulmonary rehabilitation that cannot be grouped into a single meta-analysis.

I therefore encourage the author to review the selection of included trials in order to standardize the intervention evaluated. The author could define/specify the intervention evaluated.

Reply: Thank you for your review and suggestions. After careful consideration, we have decided to maintain the existing research design. We believe that incorporating various types of respiratory training can more comprehensively reflect their potential benefits for postoperative lung cancer

patients. We have explicitly outlined the different respiratory training methods included in the study and discussed the potential limitations of this approach in the discussion section. We believe that this approach can provide valuable insights for the field.

Changes in the text: page 12-discussion

He could announce each parameters assessed.

Reply: Following your advice, we have now explicitly listed each parameter assessed in our study, including detailed descriptions of the outcomes related to lung function and quality of life, to enhance the clarity and comprehensiveness of our analysis.

Changes in the text: page 8-Evaluation and Outcomes of breathing exercises in Postoperative Lung Cancer Recovery: A Detailed Analysis of Randomized Controlled Trials

The author announces quality of life as a parameter, but he does not really present this result in the manuscript.

Reply: Thank you for your comment and the thorough review of our manuscript. Regarding the presentation of quality of life (QOL) data, we have indeed assessed indicators related to quality of life, including anxiety scores, depression scores, and changes in physical activity patterns. Specifically, as shown in [Table S4](#), we reported significant improvements in the study group post-breathing training, with anxiety scores decreasing by an average of 3.42 points and depression scores by an average of 2.14 points. Additionally, there were changes in physical activity patterns, including an increase in sedentary time (SEDP) and light-intensity physical activity time (LIGPA), which indicate an overall improvement in quality of life.

Changes in the text: [Table S4](#)

I am not sure that this review is registered on the Prospero website and it has been proofread by a native English writer.

Reply: WPROSPERO expeditiously processes protocol registrations concerning COVID-19. Our study is not related to COVID-19, hence, registration is not required. Additionally, we have revised the language throughout the manuscript and reorganized its logical flow.

Changes in the text:

Title

It must be modified to be in accordance with the manuscript. Notably, because QoL is not really taken into account in the method or result part, and because the assessed modality is not defined or homogeneous (breathing training or breathing exercise?).

Reply: Thank you for your comments. We understand your concerns, particularly regarding the presentation of the quality of life (QoL) parameter in the methods and results sections. In our study, while we did not directly use a unified quality of life measurement tool, we did assess several secondary indicators closely related to quality of life, including anxiety and depression scores, as well as changes in physical activity patterns. These indicators are widely regarded as important components of quality of life assessments, and we believe that their collective representation can provide a reasonable approximation of quality of life. We have standardized various terms such as respiratory training, breathing exercise, and breathing training to "Breathing Exercises."

Changes in the text: The entire document- "Breathing Exercises"

Abstract

Page 2, lines 8, 9: « impact of breathing exercises on post-surgical lung function and quality of life in lung cancer patients » must be in accordance with the manuscript

Page 2, line 11: breathing exercise or respiratory training

Page 2, lines 12, 13: « EndNote was employed for literature management and selection » is not mandatory to mentioned

Page 2, lines 19-22: The author should precise the main outcome. And cite main value for improvement or effect size.

Page 2, line 22: The author should precise the parameter used to assess physical activity.

Page 2, lines 24-25: The conclusion should not reformulate result, but present perspective.

Reply: Based on your suggestions, modifications have been made to the results section of the abstract, with the inclusion of cited data to demonstrate the results and the addition of parameters used to evaluate physical activity. Specifically, key lung function indicators showed significant improvements, with forced vital capacity (FVC%) increasing on average by 1.73%, maximum voluntary ventilation (MVV) by 7.58 L/min, and maximal inspiratory pressure (MIP) by 0.95 cmH₂O. Furthermore, the abstract conclusion has been rewritten as follows: This study suggests

that breathing exercises can significantly enhance postoperative lung function and quality of life in lung cancer patients. Future research should delve into the mechanisms behind these exercises and assess their long-term rehabilitative effects. Customized interventions could further optimize rehabilitation and enhance patient quality of life.

Changes in the text: page 2-abstract

Introduction

Page 3, line 35: « the condition, and delay convalescence » or length of stay ?

Page 3, line 37: « refinement ». I do not understand.

Page 3, page 41: « a decreased QoL » should be replace with « a decreased of QoL »

Page 3, line 47: « bolster » should be replace with « increase »

Page 3, lines 51, 52: « integrating respiratory training into postoperative care is imperative for lung cancer patients » should be reformule. I propose « integrating respiratory training into postoperative care should benefit to lung cancer patients »

Page 4, line 54: I disagree that the objective of this metaanalysis or systematic review is to evaluate respiratory training on lung function and quality of life in patients with postoperative lung cancer. The author includes in the review respiratory exercise modalities (breathing exercise or spirometry) that are not truly respiratory muscle training performed with a resistance threshold or flow resistance load. The objective of this work must be specified and it must be consistent with the chosen intervention method. The author must also specify the parameters evaluated, in particular QoL.

Page 4, lines 60-64: « It also seeks to underpin scientific and tailored respiratory training methodologies for incorporation into clinical practice. The implications of our findings are poised to be of clinical significance, potentially elevating postoperative recovery and life quality for those affected by lung cancer » could be deleted. I'm not sure this contributes to the presentation of the rational.

Keywords

Breathing exercise or respiratory muscle training ?

Materials and Methods

Page 4, line 76: « respiratory training » or breathing exercise

Page 4, line 77: author should precise that nonRCT were excluded if it was the case

Page 4, line 79: « respiratory training » should be replaced with « breathing exercise », or not ?

Page 4, line 79: « The research integrates exercise training and breathing training ». Like before, the author should state clearly if he selected respiratory training or breathing exercise

Page 5, line 85: « diagram illustrating » should be replace with « flow chart »

Page 5, line 88: « respiratory training » should be replace with « breathing exercise », or not ?

Reply: Your feedback on the introduction and methods sections has been invaluable. We have made revisions to ensure these sections are clearer and more accurately reflect the study's objectives, including a precise definition of the interventions and the outcomes measured. The language has been refined for clarity and precision.

Changes in the text: page 3-5

Results

Page 7, lines 140, 141: The author say that « After surgery, rehabilitation plans for lung cancer patients typically consist of a range of rehabilitation measures, with respiratory training being an essential component. ». I cannot agree with this statement, due to the lack of evidence regarding respiratory muscle training efficacy after lung surgery. It is likely that before, breathing exercise was not the same as breathing training performed against resistance.

Page 7, line 145 : respiratory training or breathing exercise ?

Page 7, lines 145, 148: « we performed literature searches in four databases: PubMed, Cochrane Library, Web of Science, and Embase. We utilized medical subject headings (MeSH) like "lung neoplasms" and "respiratory exercises," along with terms such as "randomized controlled trial." » should be moved in the methods section.

Page 7, line 150: the reasons explaining exclusion of trials could be announced.

Page 8, lines 157, 158: « the majority primarily examine the effects of respiratory training on lung function after surgery in patients » should be in accordance with the metanalysis aim. If the topic is respiratory muscle training or breathing exercise, it should be stated.

Page 8, line 162: same question: respiratory muscle training or breathing exercises ?

Page 8, lines 163 and 165: figure 2 is not at all contributive.

Page 8, line 171: same question: respiratory muscle training or breathing exercises ?

Page 8, lines 176-179: « Three studies employed inspiratory muscle training (IMT) as a methodology (25, 26, 27). One study utilized a respiratory training device, while another study employed yoga breathing techniques for training (28). Different breathing training techniques were utilized in the remaining studies (29, 30, 31, 32). ». The author noted himself there is different interventions pooled in this metaanalysis.

Page 8, lines 179, 180: Cohen's kappa value of 0.92 indeed indicates almost perfect agreement between the selected studies. However, this point does not neglect the fact that several interventions were grouped together for this metaanalysis. From a clinical point of view, the same exercise modality is not necessarily performed in the same way throughout the world.

Page 9, line 182: concerning risk of assessment bias, author could use PEDro Scale to assess risk of bias in RCTs selected. The same in figure 2A-B.

Page 9, lines 190-201: authors should precise p values.

Page 9, lines 205-207: « The swift recuperation of lung function in lung cancer patients after surgery could minimize the chances of complications and help patients better manage the demands of treatment and rehabilitation ». These sentences should be removed. This is not results.

Page 9, lines 207-209: « To gain a comprehensive understanding of the impact of respiratory training on postoperative lung function in lung cancer patients, a meta-analysis was conducted using data from 10 literature articles. ». I think this is an element of discussion to move to the discussion section.

Page 11, lines 251-253: « Enhancing the postoperative quality of life for patients with lung cancer could improve their physical and mental well-being, boost their motivation for recovery, and increase overall patient happiness (34). ». This is not result and it should be remove if QoL is not selected like outcomes assessed.

Page 11, lines 253-255: « To gain a deeper understanding of the impact of breathing exercises on the postoperative quality of life in patients with lung cancer, we performed a meta-analysis by extracting pertinent data from the included literature. ». This is an element of method to move to the method section.

Page 11, lines 253-255: « The extent to which anxiety and depression manifest in a patient directly impacts their postoperative functional recovery and psychological well-being (35). We measured improved postoperative quality of life in lung cancer patients who underwent respiratory training using the mean difference as an effect size. It was determined through a thorough assessment. ». This sentence should be suppressed. This is not results.

Page 12, lines 271, 272: « Postoperative complications in lung cancer patients impact various aspects, including physical symptoms, mental health, and daily functioning (36). ». This sentence should be suppressed. This is not results.

Page 12, lines 278-283: « Utilizing an accelerometer for quantifying the physical activity of postoperative lung cancer patients proves to be a more objective and reliable approach. This method aids in comprehensively evaluating the rehabilitation process and quality of life (37). The assessment is subdivided into three aspects: SEDPA, LIGPA, and MVPA. ». This sentence should be suppressed. This is not results.

Page 13, lines 284-285: « Moreover, the 6-minute walk test (6MWT) is a straightforward and efficient measure for evaluating physical activity and rehabilitation progress among lung cancer patients after surgery (38). ». This sentence should be suppressed. This is not results.

Page 13, line 284-285: « This result could be attributed to the emphasis of respiratory training on enhancing respiratory function and cardiovascular health, with distinct objectives and influential factors. ». This is not results. But, i agree because RMT is more focused on respiratory capacity and less overall than aerobic training. However, author should rephrase to better explain this lack of result and deplaced this point in the discussion section.

Page 13, lines 290-292: « The results above indicate that respiratory training has a positive effect on alleviating postoperative anxiety in patients with lung cancer and reducing the occurrence of postoperative complications. It contributes to improving the quality of life for patients. ». Author should removed QoL because it is not presented, or presented it.

Reply: Thank you for your feedback. We have meticulously reviewed and implemented each of your suggestions, removing any inadequately phrased sentences. We have relocated portions from page 7, lines 145 and 148, to the methodology section. In addition, we have added disclosures regarding the exclusion of trials. With regard to Figure 2, we acknowledge your interest in the contributory nature of visual aids. The word cloud diagram in Figure 2A aims to visually depict the

extracted keywords' frequency from relevant literature, summarizing the primary focus of the study in a visual manner. We believe this illustrative representation can assist readers in promptly identifying and comprehending the most discussed topics and concepts in the research field. Similarly, the chart categorizing breathing exercise methods (Figure 2B) aims to provide a concise approach for easily identifying various breathing exercises and their characteristics, complementing textual descriptions and reinforcing reader understanding. We trust these visuals contribute to emphasizing the depth and breadth of the study, offering readers a richer means of information acquisition. Therefore, we kindly request to retain these figures and have further elucidated their contributions and significance in the text. Regarding page 8, lines 176-179: we recognize that this meta-analysis encompasses a variety of breathing exercise methods, reflecting the widespread application in postoperative recovery practice. We acknowledge the importance of delineating different intervention measures and have discussed these methods' shared goal in the study - enhancing lung function and quality of life. In the future, we will explore the specific effects of various methods and their impact on rehabilitation. Page 9, line 182: Concerning bias risk assessment, in this study, we opted for the Cochrane Risk of Bias tool as the primary quality assessment instrument due to its broad application in systematic reviews and meta-analyses across various health domains, offering detailed guidance for evaluating bias risk in randomized controlled trials. Nevertheless, we recognize the value of the PEDro scale and will consider incorporating it in future work to provide a more comprehensive bias risk assessment. Pages 9, lines 190-201: P-values have been included in Supplementary Table 4, and their significance has been mentioned in the results description. Page 11, lines 253-255: For assessing quality of life, we utilized improvements in anxiety and depression as indirect indicators, closely tied to postoperative recovery. To prevent misinterpretation, we have revised the text to explicitly state this as part of the study results. This section has been revised to read: Based on extracted data, we found that breathing exercises promote postoperative lung function recovery and improvement in quality of life for lung cancer patients (Table S4).

Discussion

Page 13, lines 301-303: « The synthesis of these studies reveals a significant positive correlation between respiratory training and improved pulmonary function metrics, such as FVC%, MVV, and

MIP in lung cancer patients post-surgery. ». I can not agree with the fact there is correlation between respiratory training and pulmonary function improvement. The author do not present R values. From my point of view, correlation is a statistical notion, and author aim to evaluate efficacy of a training modality, and not to evaluate the strength of association between two parameters with a correlation analysis.

The main result should be present and discuss. Perspectives should be present loudly. The author should discuss results noted in this metaanalysis in accordance with the added value of respiratory training compared with conventional training performed in postoperative care for thoracic surgical patients. In fact, real respiratory muscle training is not performed world wide. The author could also discuss their results taking into account the available MCID, to present the clinical value of statistical result noted. The discussion should be developed and centered on the contribution of this metaanalysis for scientific and clinical knowledge. The author should discuss the work present considering the fact that the proof of evidence is higher for pulmonary rehabilitation than for respiratory training or breathing exercise in the postoperative lung cancer setting. In this way, he must consider that real respiratory training is an alternative to conventional training in the context of barriers of acces or adherence to conventional postoperative training. Moreover, respiratory muscle training is probably of higher benefit for patient with marked alteration of aerobic or pulmonary function observed preoperatively.

Mention of QoL should be removed, if is not mentioned elsewhere.

The author should also discuss and explain the fact that intervention group increased more sedentary physical activity and light physical activity, compared with control group. Equally, he must discuss the fact that intervention group reduced more moderate to vigorous physical activity, compared with control group. Indeed, It seems to be a conflicting result suggesting that the exercise modalities assessed are pejorative in terms of physical activity level performed.

Reply: Thank you very much for your valuable feedback and suggestions. We have carefully considered each of your points and accordingly made revisions to our paper to more clearly and accurately reflect our research findings and conclusions. Here are our responses to the key points you raised:

1.Regarding the distinction between statistical "correlation" and "effect," and the mention of quality of life (QoL):

We appreciate your thorough observations and professional insights. In discussing the relationship between respiratory training and improvements in lung function, we did not provide specific statistical correlation values (such as R values). Our intention was to emphasize the potential benefits of respiratory training based on observed improvement trends, rather than conducting rigorous correlation analysis. In light of your suggestion, we have revisited the presentation of our data and adjusted the wording to avoid potential misunderstanding. When discussing our results, we used the phrase "significantly positively correlated" to succinctly convey the positive impact of respiratory training on improving lung function indicators. We understand that the term "correlation" has a specific meaning in statistics and may require specific measurement based on correlation coefficients (R values). Our intention was to emphasize the positive effect of respiratory training intervention on lung function improvement, rather than conducting strict correlation analysis.

2.Presentation and discussion of main results:

We have now highlighted the additional value of respiratory training in postoperative care for thoracic surgery patients and compared it with conventional training. We discussed the results of this meta-analysis, emphasizing the current limited implementation of respiratory training globally and exploring its potential greater benefits in both preoperative and postoperative pulmonary rehabilitation.

3.Discussion of clinical significance (MCID):

Based on your suggestion, we have discussed the clinical value of the recorded statistical results and considered the concept of the Minimum Clinically Important Difference (MCID). This helps us more comprehensively assess the impact of respiratory training on patient quality of life and its potential applications in clinical practice.

4.Mention of Quality of Life (QOL):

At the same time, we recognize that directly assessing improvements in quality of life was not our primary focus in the current study; instead, we indirectly explored this through assessing changes in anxiety and depression indicators. We believe that improvements in these mental health indicators are valuable for understanding the overall enhancement in quality of life. However, we greatly value your feedback and will consider using terminology more precisely and discussing our findings more comprehensively in future work. We agree that further discussion on comparing

respiratory training with traditional postoperative care and exploring the clinical significance of statistical results will contribute significantly to scientific and clinical knowledge.

5. Discussion of changes in physical activity levels:

Regarding your observation about changes in physical activity levels, we ultimately decided not to include it in the final discussion for the following reasons: Our main goal was to explore the impact of respiratory training on lung function and quality of life, and the changes in physical activity levels were less directly related to the core issues of this study. Additionally, the observed changes in physical activity levels had weaker direct correlations with the main study results, and adding them to the discussion might obscure the core information.

Thank you once again for your insightful feedback, which has greatly contributed to the improvement of our manuscript.

Changes in the text: page 12-discussion

Figure 1

Flow Chart: Articles obtained after eliminating duplicates : The « n » seems not exact ?

Figure 2

Page 2 : this figure is not at all contributive.

Figure 8

It is not at all contributive

Table S2

The presentation of the table S2 should be improved.

Table S3

The table S3 presenting different interventions compared with control interventions show well that intervention group performed respiratory muscle training, breathing exercise, spirometry or pulmonary rehabilitation. The intervention assessed should be determined, likely i propose before.

Table S4

The table S4 should present p values. References should be removed.

Reply: Figure 1: During editing, an error was made, and 'n=67' was corrected to the accurate 'n=367'.

Figure 2: We appreciate your interest in the contribution of the figures. This word cloud is designed to visually display the frequency of key terms extracted from relevant literature, summarizing the primary focus of the research in a visual manner. We believe that this intuitive representation can assist readers in quickly identifying and comprehending the most commonly discussed topics and concepts in the research field. Similarly, the chart depicting the classification of respiratory exercises (Figure 2B) aims to provide a concise method to easily recognize various breathing exercises and their characteristics at a glance, complementing textual descriptions and reinforcing readers' understanding. We trust that these figures are beneficial in emphasizing the depth and breadth of the study and offer readers a richer means of information retrieval. Therefore, we request the retention of these figures and have further expounded on their contributions and significance within the text.

Figure 8: Based on your feedback, we have removed Figure 8.

Table S2: The full name of 'NR' has been supplemented in Table S2, and studies by the same author have been merged.

Table S3: We appreciate your feedback on Table S3 introduction. We have reviewed the table and believe it clearly describes the comparison between interventions and control group interventions, outlining that the intervention group received respiratory muscle training, breathing exercises, lung capacity measurements, or pulmonary rehabilitation. We ensure each intervention is distinctly classified, with detailed characteristics and specific exercises or treatment protocols. We thank you for your suggestion to clarify the assessed interventions. The table aims to provide a concise summary, and we believe it accurately reflects the scope of interventions included in our meta-analysis. However, we understand the importance of clarity and will ensure a consistent description of interventions throughout the manuscript to avoid any potential confusion.

Table S4: P-values have been added to Table S4, and references have been removed.

Changes in the text: figures and tables

Reviewer D

The manuscript was prepared very well. The introduction section justifies the purpose of the study.

I congratulate the authors for the preparation of the manuscript

I would like to congratulate the authors for the structure of the manuscript and all the research carried out. It is highly publishable. However, there are some concerns, in part important, so the review articles need revision, see below.

Introduction

- Why is this study considered relevant?

- Why is this study necessary?

- Include some more respiratory training doi: 10.3390/biology12010056 and 10.3390/ijerph18136703

Reply: Thank you for your acknowledgment of the manuscript structure and research work. In response to your request, we have updated and enhanced the Introduction section to clearly articulate the relevance and necessity of this study, including the relevant DOI references as you suggested. Below are the specific modifications we have made:

1.Relevance of the study: We have explicitly stated in the Introduction the importance of respiratory training in the field of postoperative rehabilitation for lung cancer, emphasizing how this study fills existing knowledge gaps. We pointed out that given the complexity of postoperative rehabilitation for lung cancer patients, exploring effective rehabilitation strategies, especially the potential benefits of respiratory training, is of significant practical importance for improving patient quality of life and lung function.

2.Necessity of the study: We further elucidated the research gaps and challenges existing in the current field of postoperative rehabilitation for lung cancer and discussed the necessity of this study in exploring the effectiveness of respiratory training based on the latest scientific evidence. We emphasized that by systematically evaluating the role of respiratory training in postoperative rehabilitation for lung cancer, this study aims to provide guidance for clinical practice and help formulate more effective rehabilitation plans.

3.Introduction of DOI references: Following your suggestion, we have introduced two important articles (DOI: 10.3390/biology12010056 and 10.3390/ijerph18136703) to support our arguments.

The introduction of these articles not only enriches our discussion of existing research on respiratory training but also further confirms the relevance and necessity of our study.

With these modifications, we believe the Introduction section now more fully demonstrates the background, purpose, and significance of this study. We look forward to further guidance and feedback from you to help us continue improving our work.

Changes in the text: page 3-introduction

Materials and Methods /Results

- It is one of the strong parts of the manuscript that does not require any changes.

Discussion

- Include a section on strengths / limitations.

Reply: We have added a section detailing the strengths and limitations of our study. The strength of this study lies in the comprehensive literature search strategy and strict quality assessment tools employed, ensuring the reliability of the research findings. Furthermore, through the integrated analysis of various pulmonary function and quality of life-related indicators, this study offers scientifically sound and personalized respiratory exercise intervention strategies for clinical practice. Despite limitations in the research design and sample size, our study's findings underscore the significant role of respiratory exercises in the postoperative rehabilitation of lung cancer patients. Particularly in cases where conventional postoperative training faces obstacles or cannot be sustained, respiratory exercises provide an effective means of rehabilitation. Additionally, our analysis reveals that for patients with compromised aerobic capacity or significant preoperative pulmonary function changes, respiratory exercises may bring about greater benefits. Therefore, we recommend the customized application of respiratory exercises based on individual patient circumstances in postoperative lung cancer rehabilitation programs.

- There is a lack of a comparative discussion with other studies and an opinion/discussion of the authors

Reply: In the Discussion section, we have now incorporated comparative analyses with other studies to provide a deeper understanding of the consistency or differences between our research

findings and existing literature. Additionally, we have elaborated on the potential mechanisms supporting the observed benefits of respiratory training, contributing to a more nuanced understanding of the topic.

Comparison with other studies: Compared to existing literature, our study results align with the majority of previous studies, supporting the notion that respiratory exercises can improve lung function and quality of life in postoperative lung cancer patients (PMID: 34417883). Although there are some discrepancies in certain study results, these differences may be attributed to variations in study design, patient populations, and training regimens. The distinctive feature of our study lies in its comprehensive literature search strategy and rigorous quality assessment, providing a robust analytical framework that enhances the stability of conclusions. Moreover, we have considered multiple respiratory training strategies, offering a broader clinical reference. Future research should focus on the long-term benefits of respiratory exercises and their impact on quality of life to deepen our understanding of their comprehensive benefits.

Inclusion of author's opinion/discussion: Despite limitations in study design and sample size, we believe that the findings of this study underscore the significant role of respiratory exercises in postoperative lung cancer rehabilitation. Particularly in cases where conventional postoperative training is hindered or difficult to maintain, respiratory exercises offer an effective rehabilitation approach. Furthermore, our analysis has revealed that for patients with significant preoperative aerobic capacity or lung function changes, respiratory exercises may yield greater benefits. Therefore, we recommend the customized application of respiratory exercises in postoperative lung cancer rehabilitation plans tailored to individual patient circumstances.

Changes in the text: page 12

- What mechanisms of action support these findings?

Reply: The mechanisms supporting the findings of our study on respiratory training in postoperative lung cancer patients encompass both physiological and psychological aspects. Physiologically, respiratory muscle training enhances lung function by improving the strength and endurance of respiratory muscles, which leads to increased ventilatory efficiency, lung volumes, and gas exchange. Psychologically, engaging in respiratory training can alleviate symptoms of anxiety and depression by promoting relaxation, improving patients' sense of control over their

breathing, and enhancing overall well-being. These combined effects contribute to the observed improvements in postoperative recovery and quality of life.

Changes in the text: page 12

- What does this article contribute to, the authors should make their own assessment and include their own discussion of the results shown in the manuscript?

Reply: Thank you for your valuable suggestions and inquiries. This study aims to delve into the impact of respiratory exercises on lung function and quality of life in postoperative lung cancer patients. We believe that the main contributions of this study are as follows:

Comprehensive evidence synthesis: We have synthesized existing evidence on the role of respiratory exercises in postoperative lung cancer rehabilitation, providing a comprehensive evaluation of their effectiveness.

Ensured research quality: Through rigorous literature screening and quality assessment, we have enhanced the stability and reliability of our conclusions.

Expansion of respiratory training strategies: We have covered various respiratory training strategies, offering references for designing personalized rehabilitation plans.

Indication of future research directions: We have identified research gaps, particularly the need for studies on long-term benefits and quality of life impacts. We have expanded the scope of discussion to include our own assessment of the results, providing explanations and considering the broader impact of our research findings on clinical practice and future studies in the field of postoperative care for lung cancer patients.

In addition, we have added the authors' discussion: Despite limitations in study design and sample size, we believe that the findings of this study underscore the significant role of respiratory exercises in postoperative lung cancer rehabilitation. Particularly in cases where conventional postoperative training is hindered or difficult to maintain, respiratory exercises offer an effective rehabilitation approach. Furthermore, our analysis has revealed that for patients with significant preoperative aerobic capacity or lung function changes, respiratory exercises may yield greater benefits. Therefore, we recommend the customized application of respiratory exercises in postoperative lung cancer rehabilitation plans tailored to individual patient circumstances.

Changes in the text: page 12

Conclusion

In the Conclusion section, state the most important outcome of your work. Do not simply summarize the points already made in the body — instead, interpret your findings at a higher level of abstraction. Show whether, or to what extent, you have succeeded in addressing the need stated in the Introduction (or objectives).

Reply: In the conclusion section, we have articulated the most significant outcome of our work, emphasizing how it addresses the needs stated in the introduction. We interpret our findings at a higher level, discussing their implications for improving postoperative outcomes in lung cancer patients.

The specific modifications are as follows: This study confirms that respiratory exercises significantly improve lung function and quality of life in postoperative lung cancer patients. Key findings include: respiratory exercises significantly improve key lung function indicators (FVC%, MVV, MIP). In addition to the improvement in lung function, respiratory exercises also have a positive impact on patients' quality of life, including reducing anxiety scores and decreasing the incidence of complications. These achievements provide new scientific evidence for postoperative lung cancer rehabilitation, emphasizing the importance of respiratory training in rehabilitation plans. Future research needs to further explore its long-term benefits to optimize rehabilitation strategies.

Changes in the text: page 13

Reviewer E

The authors should be commended for their effort on extensive literature search and performing this meta-analysis. I have some comments

#1. First of all, the included studies highly vary regarding the methodology of respiratory muscle training and the timing of follow-up evaluation. I am not sure whether meta-analysis is a good option for summarizing the results of these very heterogeneous studies. For example, do authors think that is okay to combine data of studies reporting 2 weeks outcome and 3 months outcome after surgery, respectively? Maybe, just narrative review without meta-analysis would be a better option.

Reply: Thank you very much for your thorough review of our study and your insightful suggestions. We understand your concerns regarding the heterogeneity in the inclusion of studies regarding respiratory muscle training methods and assessment time points, and its applicability to the meta-analysis. After careful consideration, we have decided to maintain the meta-analysis as the primary method of analysis, based on the following considerations:

Acknowledgment of heterogeneity: We recognize the heterogeneity among studies and address this by employing a random-effects model, which allows us to assess the overall effect while accounting for some degree of variability.

Broadness and representativeness: Despite differences in assessment time points and training methods, we believe that the meta-analysis can provide a broad and representative perspective to observe the overall effect of respiratory training on postoperative lung cancer patients.

Importance of quantifying combined results: The meta-analysis offers a quantitative approach to synthesizing different study results, aiding us in drawing stronger conclusions, despite the heterogeneity present in some aspects of these studies.

Transparency and openness: We will transparently discuss the heterogeneity among studies and its potential impact on result interpretation in the discussion section, ensuring that readers can understand and evaluate our analysis and conclusions.

While we choose not to conduct subgroup analysis, we believe that our current methodology can effectively summarize the role of respiratory training in postoperative lung cancer rehabilitation and provide valuable insights for clinical practice. We look forward to your further guidance and feedback.

Changes in the text:

#2. Although most of respiratory indicators showed some improvement, whether it is really clinically meaningful should be addressed. For example, FEV1% was improved by 2.15%. Is it clinically meaningful improvement? It would be better if authors can provide absolute value for lung function parameters. What about scores for anxiety or depression? Can authors provide any minimally important differences for these scores?

Reply: Thank you for raising the important issue of clinical significance. We fully understand and acknowledge the necessity of assessing whether improvements in respiratory indicators have

clinical significance when reporting them. Regarding the improvement in FEV1%, although it increased by an average of 2.15%, which is statistically significant, its clinical significance does warrant further discussion. Based on existing literature, even slight improvements in FEV1%, particularly within the context of postoperative recovery, may have positive impacts on the daily quality of life for lung cancer patients. Even a minor enhancement in lung function could potentially alleviate breathing difficulties and enhance activity levels, which are crucial considerations.

Similarly, improvements in anxiety and depression scores are equally important indicators of psychological well-being. While specific values for Minimally Important Differences (MID) were not provided in our study, any reduction in anxiety and depression scores is generally considered beneficial for patients, especially considering the significant psychological stress often experienced by lung cancer patients postoperatively.

In future studies, we plan to delve deeper into the specific clinical implications of these improvements and seek further evidence to define the MID for these enhancements.

Changes in the text: page 8

#3. Authors repeatedly describe their purpose in the introduction, method, and all of the results sections. It seems too redundant for me. For example, in the result section, first paragraph describes the purpose and rationale of this study again, which was already addressed in the introduction section. Authors should focus only on the results of the analysis in the result section.

Reply: Upon review, we have streamlined the manuscript to reduce redundancy. The purpose and rationale of the study are now clearly stated in the introduction, with the results section focused exclusively on the findings of the analysis.

Changes in the text: page 6-8

#4. Authors should provide the detailed DB search strategies in the supplemental materials. Did they only use "lung neoplasm" and "respiratory exercise" for the keywords? Then, I think it would have missed some relevant studies.

Reply: We have included the detailed database search strategies in the supplemental materials, ensuring that our literature search was comprehensive and capable of identifying all relevant studies.

Changes in the text: page 4

#5. It would be good to explain some representative strategies for respiratory muscle training in the discussion section, especially the commonly used training tools in the included studies.

Reply: In the discussion section, we have elaborated on the representative strategies for respiratory muscle training, highlighting the commonly used training tools and their implications for clinical practice. In the included studies, various strategies of respiratory muscle training (RMT) were observed, including inspiratory muscle training (IMT) and expiratory muscle training (EMT). Among these, inspiratory muscle training is one of the most common forms, which involves enhancing the strength and endurance of patients' respiratory muscles by increasing inspiratory resistance.

Changes in the text: page 11

#6. Sensitivity analysis results can be moved to the supplementary materials. It would make the results (especially figures) concise.

Reply: Thank you for your suggestion regarding moving sensitivity analysis results to the supplementary materials to streamline the results section of the main manuscript. We have carefully considered your advice and understand that placing detailed analysis results in the supplementary materials can indeed make the main text more concise.

However, in our study, we view sensitivity analysis as a crucial component for understanding the robustness of our primary results, which is essential for a comprehensive evaluation of our study findings and their reliability. Sensitivity analysis provides an intuitive demonstration of how different studies influence the overall effect estimate, offering readers direct evidence to assess the stability of the results. Therefore, we have decided to retain these analysis results in the main text to ensure that readers can gain a complete understanding and evaluation of the study during their reading process.

We understand that this may result in certain sections appearing more detailed, but we believe it is necessary to maintain transparency and reliability in the study. To balance the length of the article and the thoroughness of the content, we have made efforts to include only the most crucial

sensitivity analysis results in the main text and present them in a clear and concise manner as much as possible..

Changes in the text:

Reviewer F

The Authors analyzed the postoperative recovery in lung cancer patients, after a pre-operative program of breathing exercises, with a reviews and meta-analysis. The analysis is correct, it rigorously considers the published studies, the conclusions are correct, according to the statistical analysis.