INPLASY

Effect of high-intensity interval training on clinical outcomes in lung cancer patients undergoing surgery: a meta-analysis based on randomized control trials

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 28 April 2026 and was last updated on 28 April 2026.

INTRODUCTION

Review question / Objective To clarify the impact of high-intensity interval training (HIIT) on the clinical outcomes among lung cancer patients undergoing the surgery based on available randomized control trials (RCTs).

Rationale Lung cancer remains the leading cause of cancer-related mortality worldwide, and surgical resection is still the mainstay of curative treatment for patients with early-stage disease [1, 2]. Despite remarkable progress in surgical techniques and perioperative management, postoperative morbidity remains substantial, and optimizing perioperative care is essential to improve patient outcomes [3].

Patients undergoing lung cancer surgery are susceptible to a variety of adverse clinical outcomes, including postoperative pulmonary complications, prolonged hospitalization, and decreased physical performance and quality of life [4, 5]. These complications are more frequent in high-risk patients, such as those of advanced age, poor baseline pulmonary function, or comorbidities [6]. Therefore, perioperative rehabilitation strategies that enhance respiratory function, cardiopulmonary endurance, and recovery have gained increasing attention in thoracic surgery [7].

High-intensity interval training (HIIT), characterized by short bursts of vigorous exercise alternating with recovery intervals, has emerged as an efficient and effective exercise modality [8]. Evidence from cardiac, abdominal, and orthopedic surgery has demonstrated that HIIT can improve cardiorespiratory fitness, reduce postoperative complications, and accelerate functional recovery [9-11]. However, the effects of HIIT on clinical outcomes in patients undergoing lung cancer surgery remain unclear.

Condition being studied Therefore, this meta-analysis aimed to systematically evaluate the impact of HIIT on postoperative complications, functional recovery, and quality of life in lung cancer patients undergoing surgery, providing evidence for its clinical application in perioperative rehabilitation.

METHODS

Participant or population Patients were diagnosed with primary lung cancer and received the surgery.

Intervention Patients were randomly divided into the HIIT group or control group.

Comparator At least one of the observed clinical outcomes were explored.

Study designs to be included RCT.

Eligibility criteria Studies met these criteria were included: a. patients were diagnosed with primary lung cancer and received the surgery; b. studies with the design type of RCT; c. patients were randomly divided into the HIIT group or control group; d. at least one of the observed clinical outcomes were explored; e. enough data were provided for the pooled analysis; f. articles were published in English or Chinese; g. full texts were available.
Studies met these criteria were excluded: a. confounding interventions were involved; b. duplicated or overlapped data; c. reviews, case reports, meeting conferences or animal trials.

Information sources PubMed, Web of Science, Cochrane Library and CNKI databases were searched form inception up to November 3, 2025.

Main outcome(s) Pulmonary infection, atelectasis, arrhythmia, 30-day mortality, respiratory failure, cardiovascular complication, grade 2+ complication, cardiopulmonary complication and bronchopleural fistula.

Quality assessment / Risk of bias analysis Only RCTs were included in this meta-analysis, thus the Review Manager software version 5.3 was used for the quality assessment.

Strategy of data synthesis All statistical analyses were conducted by RevMan version 5.3 software. Heterogeneity between studies was assessed by I2 statistic and Q test. If significant heterogeneity was detected, represented as $I2 > 50\%$ and/or $P < 0.10$, the random effects model was used; or the fixed effects model was used [13, 14]. Continuous data were compared and analyzed as the changes from baseline values to final values. MDs with SDs were combined to calculate the MDs and 95% CIs between the HIIT and control groups. The data presented as the means and ranges were converted to means and SDs according to the formula reported by Hozo et al. [15]. Discontinuous data were compared and represented as ORs and 95% CIs. P value < 0.05 was considered as statistical significance.

Subgroup analysis None.

Sensitivity analysis None.

Language restriction None.

Country(ies) involved China - An Shun City People's Hospital.

Keywords High-intensity interval training; lung cancer; surgery; clinical outcomes; meta-analysis.

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