INPLASY

Predictive role of geriatric nutritional risk index for postoperative complications in operated esophageal cancer patients: a meta-analysis

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ADMINISTRATIVE INFORMATION

Support - No.

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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 5 September 2025 and was last updated on 5 September 2025.

INTRODUCTION

Review question / Objective To determine the association between preoperative geriatric nutritional risk index (GNRI) and postoperative complications in surgical esophageal cancer patients.

Condition being studied Esophageal cancer is a significant global health burden, ranking as one of the leading causes of cancer-related mortality worldwide [1]. The disease is particularly prevalent in certain regions, such as East Asia, where lifestyle and dietary factors contribute to its high incidence [2]. Surgical resection remains the cornerstone of curative treatment for resectable esophageal cancer, offering the best chance for long-term survival. However, esophagectomy is a complex and high-risk procedure often associated with substantial postoperative complications, including anastomotic leakage, respiratory infections, and cardiovascular events [3, 4]. These complications can significantly affect patient outcomes, prolong hospital stays, and increase mortality risk [5]. Predicting postoperative complications remains a clinical challenge, as existing predictive models often lack sufficient accuracy, generalizability, or applicability to diverse patient populations.

The Geriatric Nutritional Risk Index (GNRI), based on the serum albumin level, usual weight and ideal weight, is a valuable tool for assessing nutritional status and has shown significant prognostic value in cancer patients [6]. In long-term oncological outcomes, GNRI has been reported to be associated with survival rates, as poor nutritional status often correlates with diminished immune function, increased tumor progression, and reduced tolerance to treatments such as chemotherapy or radiotherapy [6, 7]. In the context of surgical oncology, GNRI has demonstrated utility in predicting short-term postoperative outcomes [8, 9]. For various malignancies, including gastrointestinal and thoracic cancers, low GNRI scores have been associated with a higher risk of postoperative complications such as

infections, delayed wound healing, and increased morbidity [8, 9]. This highlights the GNRI's potential as a practical and easily implementable marker to guide preoperative risk stratification and optimize perioperative care in cancer patients undergoing surgery. Esophageal cancer patients are generally elderly and prone to nutritional problems, both of which are closely associated with postoperative short-term risks. Therefore, the GNRI may have significant predictive value for short-term postoperative outcomes in patients undergoing esophageal cancer surgery, making it worthy of further clarification.

METHODS

Search strategy We searched the PubMed, Web of Science, EMBASE and CNKI databases from inception up to December 16, 2024 with following terms: geriatric nutritional risk index, GNRI, esophageal, esophagus, tumor, cancer, carcinoma and neoplasm. Both Medical Subject Headings (MeSH) and free-text terms were applied. The following search strategy was used in PubMed and adapted for other databases: ("geriatric nutritional risk index" OR GNRI) AND ("esophageal" OR "esophagus") AND ("tumor" OR "cancer" OR "carcinoma" OR "neoplasm").

Participant or population Patients received the esophageal operation due to the esophageal cancer.

Intervention GNRI was calculated before the surgery according to the formula: 1.489 × albumin (g/dl) + 41.7 × usual weight/ideal weight. Patients were divided into different groups according to the GNRI.

Comparator The incidence of complications between groups were compared.

Study designs to be included Cohort or case-controlled studies.

Eligibility criteria 1) patients received the esophageal operation due to the esophageal cancer; 2) GNRI was calculated before the surgery according to the formula: 1.489 × albumin (g/dl) + 41.7 × usual weight/ideal weight [11]; 3) patients were divided into different groups according to the GNRI and the incidence of complications between groups were compared; 4) odds ratios (ORs) with 95% confidence intervals (CIs) were reported or enough data were provided to calculate them; 5) full texts were available and articles were published in English or Chinese.

Information sources Following data were collected from included studies: the name of first author, publication year, country, sample size, age, tumor stage, pathological type, history of neoadjuvant therapy, cutoff value of GNRI, endpoint, OR and 95% CI.

Main outcome(s) Primary outcome was the overall complication, which was defined as the incidence of any postoperative complication reported in each included study, regardless of type or severity. All complications documented by the original authors (e.g., pulmonary, cardiac, infectious, renal, bleeding, or other procedure-related events) were counted toward the overall complication rate.

Quality assessment / Risk of bias analysis In this meta-analysis, the quality of included studies were evaluated by the Newcastle-Ottawa Scale (NOS) score tool and studies with a NOS score > 5 were defined as high-quality studies.

Strategy of data synthesis All statistical analyses were conducted using STATA (version 15.0) software. Heterogeneity between included studies was assessed by I2 statistics. If significant heterogeneity was detected (I2 > 50%), the random-effects model was applied; otherwise, the fixed-effects model was applied. ORs and 95% CIs were combined to evaluate the predictive role of postoperative complications among surgical esophageal cancer patients.

Sensitivity analysis Sensitivity analysis by excluding each included studies at one time was conducted to detect the sources of heterogeneity and assess the stability of the overall results.

Country(ies) involved China - West China Hospital, Sichuan University.

Keywords Geriatric nutritional risk index; esophageal cancer; postoperative complication; meta-analysis.

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