

Phase Angle as a Prognostic Factor in Patients with Cancer: A Systematic Review of Existing Evidence via a Meta-Analysis

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Author Affiliation:The First Affiliated Hospital of
Chongqing Medical University.**ADMINISTRATIVE INFORMATION****Support** - No funding was received for conducting this study.**Review Stage at time of this submission** - Completed but not published.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY2024100025**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 7 October 2024 and was last updated on 7 October 2024.**INTRODUCTION**

Review question / Objective The evaluation of the PA in patients with cancers is a promising tool for predicting patient survival and formulating therapeutic strategies. Some systematic reviews have shown that PA has a significant correlation with the overall survival of cancer patients, while some authors believe that PA has nothing to do with the prognosis of breast cancer. As the literature is still heterogeneous in this regard, the present meta-analysis was conducted to investigate the relationship between PA and survival among adult patients diagnosed with cancer. Clarifying this relationship provides information to assess the usability of the PA as a potential tool for cancer prognosis and survival.

Condition being studied Survival prognostication is a challenging task, particularly in patients with advanced cancer. Approximately 80% of patients with advanced cancer want to be informed of their prognosis, especially their treatment outcomes, adverse effects, and bodily changes in their last

months and days of life. Considering the complexity and time-consuming nature of anthropometry and nutrition screening methods, as well as the delays associated with laboratory indicators, a more portable and low-cost method of evaluating cancer survival is needed. In recent years, the scientific community's interest in the effectiveness of PA as an indicator has been increasing, as a strong correlation between prognosis and diagnostic factors has been observed. According to statistics, more than 350 articles have been published since 2004, and 20% of these articles were published in 2022 alone. The published systematic reviews on this topic have covered sarcopenia, obesity, metabolic diseases, surgery, critical illnesses, heart failure, chronic kidney disease, coronavirus disease-2019 (COVID-19), and other diseases and conditions.

METHODS

Search strategy Our database searches were conducted using the following keywords: (phase angle or bioelectrical impedance or electric

impedance or bioelectric impedance) and (cancer survival or prognosis or cancer mortality). No filters were applied for language, study design, or publication date during our database searches.

Participant or population Adult patients with any type of cancer.

Intervention The use of BIA for evaluating PA.

Comparator Differences in PA.

Study designs to be included Cohort studies, cross-sectional studies.

Eligibility criteria The inclusion criteria were as follows: (1) original human cohort studies; (2) studies published in English; (3) studies evaluating the PA in relation to survival among patients with any type of cancer. We excluded articles that were non-human studies, case reports, review articles, any studies without original data, or articles without any related outcome measures.

Information sources Searches were performed until the 20th of December 2023 using the following electronic databases: PubMed and EMBASE. Both medical words and free-text search terms were adopted. The reference lists of related and included studies were also screened to identify any additional articles.

Main outcome(s) The relative risks (RRs) or hazard ratios (HRs) for the correlation between PA and cancer patient survival.

Data management We excluded articles that were non-human studies, case reports, review articles, any studies without original data, or articles without any related outcome measures. After being read by two independent reviewers (QR Kong and LJ Tian), the candidate articles were screened for inclusion in our meta-analysis based on their titles and abstracts. If a study could not be categorized by its abstract, a full-text review was carried out. The reported data required for our meta-analysis were then extracted (YH Wang). Any disagreements were resolved through discussion and, if necessary, consultation with a third investigator (M Yu).

Quality assessment / Risk of bias analysis We assessed the quality of the included studies by using the Newcastle–Ottawa Quality Assessment Scale (NOS), which consists of three domains: selection, comparability, and outcome. The maximum score is 9 points. Studies with scores ≥ 7 , scores of 4–6, and scores ≤ 3 points were

considered as high-, moderate-, and low-quality studies, respectively.

Strategy of data synthesis STATA 14 (STATA Corporation, College Station, TX, USA) was used for our analysis. Two reviewers independently conducted the data synthesis, considering the meta-bias of the data extracted from all the primary studies. All participants were divided into two groups according to cut-off value. A study was considered statistically significant when at p-value < 0.05 . RRs or HRs were used to measure the relationship between PA and cancer survival and converted by using their natural logarithms. Heterogeneity was assessed for all endpoints using the I² statistic. In the presence of significant heterogeneity, a random effects model was used; otherwise, a fixed effects model was implemented. Publication bias was assessed using Begg's statistics, and it was considered that there is no publication bias when the p value was more than 0.05.

Subgroup analysis Our subgroup analyses showed that geographical population (American: HR=0.66, 95% CI 0.55–0.79, I² =0.0%; European: HR=0.63, 95% CI 0.47–0.84, I² =23.2%; Asian: HR=0.48, 95% CI 0.31–0.74), the type of cancer (head and neck, colorectal, lung, or pancreatic cancer), and type of therapy (palliative vs. non-palliative treatment) did not change the prognostic value.

Sensitivity analysis When publication bias was found, trim and fill analysis was implemented to adjust for the effects of potential publication bias on overall effect size.

Country(ies) involved China - The First Affiliated Hospital of Chongqing Medical University.

Keywords phase angle, cancer, survival, prognosis, meta-analysis.

Contributions of each author

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