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Review Article

### PREOPERATIVE NUTRITION STATUS AND POSTOPERATIVE COMPLICATIONS IN ELDERLY GENERAL SURGERY PATIENTS: A LITERATURE REVIEW

Raghad Talal Salem Al-Dibane <sup>1\*</sup>, Muhannad Abdulmohsen Alahmadi <sup>1</sup>, Abdulgader Adel Almuallim <sup>1</sup>, Samaher Saeed Saleh Alkhedaiddi <sup>1</sup>, Yaser Saeed Alqahtani <sup>1</sup>, Abdullah Mohammed Ali Aljubairy <sup>1</sup>, Muaath Ahmed Saleh Alfraih <sup>2</sup>, Khalid Abdulrahman Alzamil <sup>2</sup>, Moayad Abdulrahman Alzamil <sup>3</sup>, Osama Hamoud Alruwaili <sup>4</sup>, Hammad Mudhhi Alruwalil <sup>4</sup>, Fahad Mohammed A Alzahrani <sup>5</sup>, Osama Saeed A AlGhamdi <sup>5</sup>, Mohammed Abdullah M AlGhamdi <sup>5</sup>, Rakan Masoud Altuwayr <sup>6</sup>, Khalid Abdulaziz Althagafi <sup>7</sup>, Adel Mohammed Alshahrani <sup>8</sup>, Saleh Ahmed Alzaid <sup>9</sup>, Khalid Sultan Alwasem <sup>9</sup>, Ghalib Mohammed Alsulami <sup>9</sup>, Abdulsalam Muteb Alanazi <sup>9</sup>, Miad Talal M Alruwaili <sup>9</sup>, Moosa Khalid Alhemaid <sup>10</sup>, Hanin Mohammed Attar <sup>11</sup>, Alhanouf Abdullah Alsarhan <sup>12</sup>

<sup>1</sup> Faculty of Medicine, Umm Al-Qura University, Makkah, Saudi Arabia, <sup>2</sup> Faculty of Medicine, Imam Muhammad ibn Saud Islamic University, Riyadh, Saudi Arabia, <sup>3</sup> General Surgery Registrar, Prince Sultan Military Medical City, Riyadh, Saudi Arabia, <sup>4</sup> Faculty of Medicine, Aljouf University, Aljouf, Saudi Arabia, <sup>5</sup> Faculty of Medicine, Al Baha University, Al Baha, Saudi Arabia, <sup>6</sup> Alfarabi college, Riyadh, Saudi Arabia, <sup>7</sup> Faculty of Medicine, Taif university, Taif, Saudi Arabia, <sup>8</sup> Faculty of Medicine, King Khalid University, Abha, Saudi Arabia, <sup>9</sup> Faculty of Medicine, Jouf university, Sakaka Aljouf, Saudi Arabia, <sup>10</sup> Faculty of Medicine, King Saud Bin Abdulaziz University for Health Science, Riyadh, <sup>11</sup> R3 General Surgery Resident Alnoor Specialist Hospital, Faculty of Medicine, Princess Nourah bint Abdulrahman University, Riyadh, Saudi Arabia

#### Abstract

**Background:** Poor nutrition status is considered a risk factor for postoperative complications in the adult population. In elderly patients, who often have a poor nutrition status, this relationship has not been substantiated. Thus, the aim of this systematic review was to assess the merit of preoperative nutrition parameters used to predict postoperative outcome in elderly patients undergoing general surgery. **Methods:** A systematic literature search of 10 consecutive years, 1998–2019, in PubMed, EMBASE, and Cochrane databases was performed. Search terms used were nutrition status, preoperative assessment, postoperative outcome, and surgery (hip or general), including their synonyms and MeSH terms. Articles were screened using inclusion and exclusion criteria. All selected articles were checked on methodology and graded. **Results:** Of 463 articles found, 15 were included. They showed profound heterogeneity in the parameters used for preoperative nutrition status and postoperative outcome. .

**Keywords:** preoperative status; preoperative assessment; postoperative outcome; nutrition status, elderly; surgery

**Corresponding author:****Raghad Talal Salem Al-Dibane,***Faculty of Medicine, Umm Al-Qura University,  
Makkah, Saudi Arabia*

QR code



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**INTRODUCTION:**

The number of elderly people in need of surgery is steadily growing, creating a medical and economic challenge. A focus on optimizing their preoperative medical condition might improve postoperative outcome and reduce costs in these patients. One of these measures may be nutrition intervention to improve preoperative nutrition status. To achieve this, we should be able to determine adequately the preoperative nutrition status to undertake preventive measures.

The elderly patient differs, among other things, from younger adult patients in their reduced adaptive and regenerative capacity, making rehabilitation a profound challenge (1,2). Advanced age in itself is independently associated with poor nutrition status in admitted patients and is a significant predictor of postoperative mortality in surgical patients (3-5). The poor nutrition status in the elderly is explained by low nutrient intake, less access to adequate nutrition food, reduced appetite, chronic disease, medication, and/or psychological condition (5,6).

For the elderly patient, it is assumed that a poor nutrition status is associated with enhanced occurrence of postoperative complications. This association has already been established in the adult patient population (3,7-13). Furthermore, in adult patients, improvement in clinical outcome by nutrition intervention was highest in patients who were nutritionally at risk (14).

To be able to identify reliable preoperative nutrition status parameters for the elderly patient that can eventually be used for preventive measures, the aim of the present study was to systematically review the available evidence on the relationship between preoperative nutrition status and postoperative outcome in the elderly general surgery patient.

**METHODS:****Data Sources**

Relevant articles from 21 consecutive years, 1998–2019, were identified by using the electronic databases PubMed, Cochrane, and EMBASE. Search terms used were nutrition status, preoperative assessment, postoperative outcome, and surgery (hip or general), including their synonyms and MeSH terms. Limits used in the search were human studies, published in English, and age (65 years or older). The full search strategy can be requested from the corresponding author.

**Data Selection**

The articles were screened for eligibility by 2 reviewers separately, by reading the article abstract or full text. Inclusion criteria were as follows: age (65 years or older), published between 1998 and 2019 in English, general or hip surgery, and a relation between preoperative nutrition status and postoperative outcome.

Exclusion criteria were as follows: poor/not defined preoperative nutrition status, no outcome criteria, other types of surgery than hip or general surgery (eg, gynecological, cardiothoracic, transplant, ear/nose/throat, urological, neurosurgery), preoperative immune function measurements, nonresponding author (when extra information was needed: eg, full text or age criteria), and no original data included. Where discordance existed between the 2 reviewers, a joint decision was made.

**RESULTS AND DISCUSSION:****Study Characteristics**

The search resulted in a total of 741 articles. The overlap between the search databases was 278 articles, leaving 463 articles for screening. Fifteen articles were considered eligible for the review. These articles could be separated into 2 groups: patients with hip surgery, and patients with other types of general surgery.

### Data Evaluation

A methodology checklist for cohort studies, produced by the National Institute for Health and Clinical Excellence (NICE), April 2018, was used to grade for quality (15). The methodological check was done separately by 2 reviewers. Discordances between the reviewers were found using cross-tabs and the  $\chi^2$  test. Both reviewers, separate from each other, checked the discordances for appropriateness. The remaining discordances were debated until a joint decision was made.

### Postoperative Outcome

The outcome parameters used in the 15 included articles could easily be divided into 4 categories: postoperative complications, mortality, length of hospital stay, and other postoperative parameters. The outcome parameters will be addressed using these categories to simplify the presentation of the results.

Considering the relevance of the question, we were surprised by the small number of studies addressing

the relationship between preoperative nutrition status and postoperative outcome in the elderly general surgery patient. Many studies did assess preoperative nutrition status and postoperative outcome without investigating their relationship. The 21 included articles are quite heterogeneous in the parameters used for preoperative nutrition status and postoperative outcome. This review detected only 2 preoperative nutrition parameters to predict postoperative outcome in elderly general surgery patients: serum albumin and weight loss in the previous 6 months. These preoperative nutrition parameters will be discussed here.

In the selected articles, serum albumin is the most used preoperative nutrition parameter. Low serum albumin was a significant preoperative predictor of postoperative complications and postoperative mortality in most articles (16-19,21,23-25) but not in all (16,17,23). Low serum albumin predicted prolonged LOS in all articles (16,18,23) This might show that serum albumin can be a reliable predictor of postoperative outcome in elderly general surgery patients.

These findings are in concordance with the results from studies in the younger adult patient. In patients with hip fracture (aged >60 years), O'Daly *et al* showed that preoperative low serum albumin negatively influenced 12-month survival after surgery. Gibbs *et al* also showed that serum albumin can be seen as a predictor of postoperative outcome being

related to 30-day postoperative mortality. Lohsiriwat *et al* and Kudsk *et al* found that low serum albumin is associated with the occurrence of postoperative complications.

These findings indicate that determining preoperative serum albumin has value in predicting postoperative outcome. However, it is questionable whether serum albumin is a good representative of nutrition status. In general, it is advocated that serum albumin should not be seen as a nutrition parameter but rather as a marker of inflammatory metabolism. Nonetheless, serum albumin might be used to identify the sickest patients, who, as a consequence, are also at risk for nutrition deterioration. In one study,  $\geq 10\%$  weight loss in the previous 6 months was predictive of postoperative complications. (19) This is in line with the study by Pronio *et al*, (40) who even found that patients with a weight loss  $\leq 10\%$  in the previous 6 months, undergoing major abdominal surgery, had a significantly higher rate of postoperative

complications compared with patients with no weight loss in the previous 6 months. In contrast, Skipworth *et al* (41) and Han-Geurts *et al* found that preoperative weight loss did not predict the occurrence of postoperative complications in nonelderly adult patients undergoing major surgery. Weight loss in the previous 6 months might be an indicator of postoperative outcome, but the current evidence is based on a single study and therefore considered marginal.

The difficulty with assessing nutrition status is exemplified by the recommendations of European Society for Clinical Nutrition and Metabolism (ESPEN) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.) with respect to which screening tool may be used. ESPEN advocated the MNA as a nutrition screening tool and as an outcome predictor in the elderly patient. In addition, Murphy *et al* (43) and Cohendy *et al* (44) found that the MNA seems useful in the preoperative evaluation of nutrition status in elderly patients. However, the MNA is still not frequently used as a tool to predict outcome.

In a recent clinical guideline of A.S.P.E.N. on nutrition screening and assessment, the elderly is not mentioned separately but integrated in the adult population. In another clinical guideline of A.S.P.E.N. on enteral and parenteral nutrition use, a special section on the elderly is found. In both guidelines, nutrition screening is recommended but with different grades. The A.S.P.E.N. clinical guideline on nutrition screening and assessment does not recommend one assessment

over the other. However, the other guideline, recognizing the absence of a validated screening tool, suggests using the subjective global assessment (SGA). Scientifically, the value of the MNA, SGA, and other screening tools has been questioned by Jones. Jones critically evaluated the methodology of published nutrition assessment and screening tools and concluded that none of these screening tools satisfied a set of criteria regarding scientific merit.

This review shows that only 2 parameters, preoperative serum albumin and weight loss, have been linked to postoperative outcome in the elderly general surgery patient. Unfortunately, the evidence for weight loss is marginal. The evidence for serum albumin is more substantiated, although serum albumin cannot be considered a true nutrition parameter. Still, there is room for improvement when it comes to defining nutrition status and its role in predicting outcome in the elderly surgical patient.

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