

# INPLASY

INPLASY202360044

doi: 10.37766/inplasy2023.6.0044

Received: 15 June 2023

Published: 15 June 2023

## Corresponding author:

Mislav Radić

mislavradic@gmail.com

## Author Affiliation:

Internal Medicine Department,  
University Hospital Split, Split,  
Croatia.

## Lean mass, fat mass, phase angle, body mass index and total body mass in systemic sclerosis patients - Protocol for a sytematic review and meta-analysis

Radić, M\*<sup>1</sup>; Kolak, E\*<sup>2</sup>; Đogaš, H\*<sup>3</sup>; Gelemanović, A<sup>4</sup>; Bučan Nenadić, D<sup>5</sup>; Vučković, M<sup>6</sup>; Radić, J<sup>7</sup>.

## ADMINISTRATIVE INFORMATION

**Support** - This research is part of the project “Digitalization and improvement of nutritional care for patients with chronic diseases” co-financed by the European Regional Development Fund through the Operational Program, “Competitiveness and Cohesion 2014–2020” KK.01.1.1.04.0115.

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

**Conflicts of interest** - None declared.

**INPLASY registration number:** INPLASY202360044

**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 15 June 2023 and was last updated on 15 June 2023.

\*Dr. Mislav Radić, Ela Kolak and Dr. Hana Đogaš contributed equally to this work.

## INTRODUCTION

**Review question / Objective** The aim of this systematic review is to summarize current evidence regarding body composition parameters in systemic sclerosis patients compared to healthy population in order to gain new insights and improve clinical care in the context of the nutritional status of systemic sclerosis patients. To this end, the proposed systematic review will address the following question: Does, and in what way, lean mass, fat mass, phase angle, total body mass and body mass index parameters differ in systemic sclerosis compared to healthy population?

**Rationale** Assessment of body composition is based on dividing the total body mass of an individual into the relative compartments of fat

mass and fat-free mass comprised of muscles, bones, organs, ligaments, tendons and water. Several methods are available for body composition measurements such as hydrostatic weighing, dual-energy X-ray absorptiometry (DXA), bioelectrical impedance analysis (BIA), digital image analysis, air displacement plethysmography, computed tomography and magnetic resonance imaging. Although none of the mentioned methods is accepted as best, BIA and DXA are most commonly used while DXA is considered as a preferred measure with the addition of bone mineral content assessment along with fat mass and fat-free mass. Systemic sclerosis has a substantial impact on morbidity, mortality, and quality of life, therefore, posing a major economic burden on the health care system and society. Nevertheless, nutritional status in SSc is rarely evaluated, often followed by incomplete data

reports regarding body composition parameters. Recently, nutritional status in SSc has been gathering attention considering the dysfunction of the GI tract present in almost all patients affected with systemic sclerosis among them gastro-oesophageal reflux disease, gastroparesis, small intestinal bacterial overgrowth, intestinal pseudo-obstruction, malabsorption, all with negative influence on nutritional status. Therefore, overall nutritional status of systemic sclerosis patients and discerning which parameters specifically have the most effect on morbidity and mortality in systemic sclerosis proves to be of highest value in clinical approach and treatment of these patients.

**Condition being studied** Systemic sclerosis is a complex immunemediated connective tissue disease characterized by vasculopathy or blood vessel damage, immunologic abnormalities, and extensive fibrosis of the skin and internal organs such as the lungs, heart, kidneys, musculoskeletal system, and the gastrointestinal tract. Although considered a rare disease with an estimated annual incidence of between 0.6 and 5.6 per 100,000 adults and high female predominance, it has a substantial impact on morbidity, mortality, and quality of life, posing a major economic burden on the health care system and society. As the dysfunction of the gastrointestinal tract is present in almost all patients affected with systemic sclerosis, nutritional status differs significantly compared to healthy population and is considered one of the main predictors of morbidity and mortality in systemic sclerosis patients.

## METHODS

**Search strategy** PubMed: ("systemic sclerosis" OR scleroderma) AND ("nutritional status" OR "body composition" OR "fat mass" OR "muscle mass") - no filters used Scopus: ("systemic sclerosis" OR scleroderma) AND ("nutritional status" OR "body composition" OR "fat mass" OR "muscle mass") - filters used: excluding Review, Letter, Conference paper, Short survey, Editorial and Book chapter. Cochrane library: ("systemic sclerosis" OR scleroderma) AND ("nutritional status" OR "body composition" OR "fat mass" OR "muscle mass") - no filters used. Web of Science: ("systemic sclerosis" OR scleroderma) AND ("nutritional status" OR "body composition" OR "fat mass" OR "muscle mass") - filters used: excluding Preprint Citation Indeks (Database), Meeting, Review Article, Case Report, Letter, Patent, Book, Editorial Material, Reference Material, Abstract (Document Types).

**Participant or population** Systemic sclerosis patients (women and men) with appropriate healthy controls that have body composition measurements using BIA or DXA, do not have multiple comorbidities or other immunological diseases, and are older than 18 years will be included in this review, with no exclusions based on ethnicity or race.

**Intervention** Not applicable.

**Comparator** Not applicable.

**Study designs to be included** Cohort studies and observational studies - case-control, cross-sectional and longitudinal studies.

**Eligibility criteria** Studies with available data needed for analysis - lean mass, fat mass, body mass index and total body mass parameters, available in the English language and in full version online, studies not including control groups with multiple comorbidities.

**Information sources** Electronic databases (MEDLINE, EMBASE, Web of Science Core Collection, BIOSIS Citation Index, Current Contents Connect, Derwent Innovations Index, SciELO Citation Index, Science Citation Index, Conference Proceedings Citation Index, Book Citation Index, Emerging Sources Citation Index) and a hand search of reference lists of highly relevant articles in this topic.

**Main outcome(s)** Lean mass, fat mass, total body mass and body mass index measurements in systemic sclerosis patients compared to healthy controls.

**Additional outcome(s)** Differences in dual-energy X-ray absorptiometry and bioelectrical impedance analysis lean mass and fat mass measurements in systemic sclerosis patients compared to healthy controls.

**Data management** The authors (Ela Kolak - methodology expert and Hana Đogaš - review topic advisor) conducted an independent literature search based on the PICO components. The reviewers Hana Đogaš and Ela Kolak conducted the assessment of studies in searched databases independently and to reach the final number of included patients and studies differences were resolved by discussion and consensus among all researchers.

**Quality assessment / Risk of bias analysis** In assessing the risk of bias and quality of the

---

included studies the Newcastle–Ottawa Scale (NOS) is used. The NOS assessed three categories (selection, comparability, and exposure/outcome) with a maximum total score of 9 (for case-control or cohort studies) or 10 points (for cross-sectional studies). A score of 7 or higher indicates high quality, a score of 4 to 6 indicates a moderate risk of bias, and a score of 0 to 3 indicates a high risk of bias. The reviewers Hana Đogaš and Ela Kolak conducted the assessment independently and to reach the final assessment differences were resolved by discussion and consensus among all researchers.

Author 5 - Dora Bučan Nenadić.  
Author 6 - Marijana Vučković.  
Author 7 - Josipa Radić.

**Strategy of data synthesis** To evaluate body composition parameters in patients with systemic sclerosis in comparison to healthy controls, a random-effects meta-analysis model is applied with inverse variance weighting and mean difference with a 95% confidence interval is obtained. Mean differences are considered significant if the P-value < 0.05 in the test for overall effect. Heterogeneity between studies is evaluated using the I<sup>2</sup> index and significant heterogeneity between the studies is considered if the test for heterogeneity was significant (P-value < 0.05).

**Subgroup analysis** Based on the assessment method - BIA or DXA, subgroup meta-analyses are performed for lean mass and fat mass variables.

**Sensitivity analysis:** The studies are not excluded regarding the NOS quality assessment. Sensitivity analysis will not be conducted due to design of included studies.

**Language restriction** Only observational or cohort studies published in English will be considered for inclusion.

**Country(ies) involved** This study is being carried out in University Hospital Split, in Split, Croatia.

**Other relevant information** Dr. Mislav Radić, Ela Kolak and Dr. Hana Đogaš contributed equally to this work.

**Keywords** Systemic sclerosis; body composition; DXA; BIA; nutritional status; lean mass; phase angle.

#### **Contributions of each author**

Author 1 - Mislav Radić.

Email: [mislavradic@gmail.com](mailto:mislavradic@gmail.com)

Author 2 - Ela Kolak.

Author 3 - Hana Đogaš.

Author 4 - Andrea Gelemanović.