

Diagnostic Criteria and Clinical Evolution of Systemic Lymphedema Caused by Obesity: Bioimpedance Analysis

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Letter to the Editor

When monitoring the evolution of lymphedema in obese patients using bioimpedance, the authors detected a well-defined clinical progression, which they classified into four clinical stages ranging from subclinical lymphedema to clinical systemic lymphedema meeting bioimpedance criteria. Clinical systemic lymphedema evaluated using bioimpedance is determined only when it involves the entire body.

Obesity is currently one of the biggest challenges to medicine and causes a set of clinical problems, including altered permeability, the inflammatory process and changes in the lymphatic system.^[1] Moreover, studies have associated obesity with both upper and lower limb lymphedema.^[2]

During routine electrical bioimpedance analyses, Godoy & Godoy recently identified an important change in the quantity of intracellular and extracellular liquid as well as liquid in the limbs and trunk, but without meeting bioimpedance criteria for clinical lymphedema, which the authors denominated subclinical systemic lymphedema.^[3] When monitoring the evolution of lymphedema in obese patients using bioimpedance, the authors detected a well-defined clinical progression, which they classified into four clinical stages ranging from subclinical lymphedema to clinical systemic lymphedema meeting bioimpedance criteria.

Clinical lymphedema caused by obesity and diagnosed by bioimpedance undergoes four well-defined clinical stages during its evolution, independently of the body mass index (BMI). In stage I, subclinical systemic lymphedema is detected based on increases in intracellular and extracellular body water and water in all limbs and trunk without meeting the bioimpedance criteria for clinical lymphedema [Table 1]. In stage II, subclinical systemic lymphedema is detected, along with clinical lymphedema diagnosed by bioimpedance in only the lower limbs [Table 2]. In stage III, the patient has systemic lymphedema along with clinical edema of the lower limbs and trunk [Table 3]. In stage IV, generalized clinical edema is detected in all limbs and the trunk [Table 4], which is clearly diagnosed using bioimpedance.

The initial diagnostic difficulty is lower limb lymphedema, which may be associated with congenital lymphedema, thereby characterizing mixed lymphedema associated with obesity. When damage is caused to the lymphatic or venous system, the limb can progress to clinical lymphedema either unilaterally or bilaterally. Therefore, a set of

clinical considerations should be made for a precise diagnosis and subsequent treatment.

Clinical systemic lymphedema evaluated using bioimpedance is determined only when it involves the entire body. Another aspect to consider is that a higher BMI denotes a greater probability of developing clinical systemic lymphedema, but this condition can also be detected in individuals with a lower BMI. This paves the way for a new line of research to gain a better understanding of obesity and seek the resolution of this aspect.

Table 1: Bioimpedance results of 44-year-old obese patient with subclinical systemic lymphedema (Stage I lymphedema caused by obesity).

	Value (ml)	Normal values (ml)	Total extracellular water/total body water ratio-values(ml)
Total intracellular water	34.2	18.1 to 22.3	
Total extracellular water	22.3	10.9 to 13.3	
Total extracellular water/total body water ratio	0.393	0.36 to 0.39	
BMI	51.1	18.5 to 25.0	
Right arm	3.19	1.45 to 1.77	0.376 limit (0.36-0.39)
Left arm	3.20	1.45 to 1.77	0.386 limit (0.36-0.39)
Trunk	24.1	1.36 to 17.1	0.379 limit (0.36-0.39)
Right leg	6.80	4.40 to 5.61	0.388 limit (0.36-0.39)
Left leg	6.89	4.40 to 5.61	0.378 limit (0.36-0.39)

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How to Cite this Article: de Godoy JMP, et al. Diagnostic Criteria and Clinical Evolution of Systemic Lymphedema Caused by Obesity: Bioimpedance Analysis. Ann Med Health Sci Res. 2019;9:420-421

Table 2: Bioimpedance results of 46-year-old obese patient with subclinical systemic lymphedema and chronic lymphedema of lower limbs determined by bioimpedance (stage II lymphedema caused by obesity).

	Value (ml)	Normal values (ml)	Total extracellular water/total body water ratio-values (ml)
Total intracellular water	22.7	11.1 to 14.2	
Total extracellular water	21.6	10.9 to 13.3	
Total extracellular water/total body water ratio	0.396	0.36 to 0.39	
BMI	61.3	18.5 to 25.0	
Right arm	3.39	1.45 to 1.77	0.376 limit (0.36-0.39)
Left arm	3.40	1.45 to 1.77	0.386 limit (0.36-0.39)
Trunk	25.4	1.32 to 16.1	0.389 limit (0.36-0.39)
Right leg	8.80	4.60 to 5.62	0.395 limit (0.36-0.39)
Left leg	12.89	4.60 to 5.62	0.412 limit (0.36-0.39)

Table 3: Bioimpedance results of 42-year-old obese patient with subclinical systemic lymphedema and chronic lymphedema of lower limbs and trunk determined by bioimpedance (stage III lymphedema caused by obesity).

	Value (ml)	Normal values (ml)	Total extracellular water/total body water ratio-values (ml)
Total intracellular water	33.2	17.7 to 22.7	
Total extracellular water	21.3	10.9 to 13.3	
Total extracellular water/total body water ratio	0.401	0.36 to 0.39	
BMI	61.3	18.5 to 25.0	
Right arm	3.39	1.44 to 1.76	0.376 limit (0.36-0.39)
Left arm	3.38	1.44 to 1.76	0.374 limit (0.36-0.39)
Trunk	24.1	1.33 to 16.2	0.391 limit (0.36-0.39)
Right leg	8.80	4.60 to 5.61	0.395 limit (0.36-0.39)
Left leg	9.19	4.60 to 5.61	0.412 limit (0.36-0.39)

Table 4: Bioimpedance results of 47-year-old obese patient with subclinical systemic lymphedema and chronic lymphedema of upper limbs, lower limbs and trunk determined by bioimpedance (stage IV lymphedema caused by obesity).

	Value (ml)	Normal values (ml)	Total extracellular water/total body water ratio-values(ml)
Total intracellular water	41.2	26.7 to 31.7	
Total extracellular water	28.3	16.9 to 19.3	
Total extracellular water/total body water ratio	0.403	0.36 to 0.39	
BMI	59.3	18.5 to 25.0	
Right arm	3.95	2.51to 3.06	0.391 limit (0.36-0.39)
Left arm	4.02	2.51to 3.06	0.395 limit (0.36-0.39)
Trunk	29.8	20.1 to 24.5	0.398 limit (0.36-0.39)
Right leg	8.80	4.60 to 5.61	0.411 limit (0.36-0.39)
Left leg	9.19	4.60 to 5.61	0.416 limit (0.36-0.39)

Conflict of Interest

The authors disclose that they have no conflicts of interest.

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