

InBody

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Phase Angle as a Biomarker for Frailty and Postoperative Mortality: The BICS Study

Louis Mullie, Alexandrine Obrand, Melissa Bendayan, Amanda Trnkus, Marie-Claude Ouimet, mmanuel Moss, MD; Annabel Chen-Tournoux, Lawrence G. Rudski, Jonathan Afilalo

Journal of the American Heart Association
Vol 7, Issue 17, e008721, Sep 2018

ABSTRACT

Background

Phase angle (PA) is a bioimpedance measurement that is determined lean body mass and hydration status. Patients with low PA values are more likely to be frail, sarcopenic, or malnourished. Previous work has shown that low PA predicts adverse outcomes after cardiac surgery, but the effect of PA on survival has not previously been assessed in this setting.

Methods and Results

The BICS (Bioimpedance in Cardiac Surgery) study recruited 277 patients undergoing major cardiac surgery at 2 university-affiliated hospitals in Montreal, QC, Canada. Bioimpedance measurements as well as frailty and nutritional assessments were performed preoperatively. The primary outcome was all-cause mortality. Secondary outcomes were 30-day mortality, postoperative morbidity, and hospital length of stay. There were 10 deaths at 1 month of follow-up and 16 deaths at 12 months of follow-up. PA was associated with age, sex, body mass index, comorbidities, and frailty, as measured by the Short Physical Performance Battery and Fried scales. After adjusting for Society of Thoracic Surgeons–predicted mortality, lower PA was associated with higher mortality at 1 month (adjusted odds ratio, 3.57 per 1° decrease in PA; 95% confidence interval, 1.35–9.47) and at 12 months (adjusted odds ratio, 3.03 per 1° decrease in PA; 95% confidence interval, 1.30–7.09), a higher risk of overall morbidity (adjusted hazard ratio, 2.51 per 1° decrease in PA; 95% confidence interval, 1.32–4.75), and a longer hospital length of stay (adjusted b, 4.8 days per 1° decrease in PA; 95% confidence interval, 1.3–8.2 days).

Conclusions

Low PA is associated with frailty and is predictive of mortality, morbidity, and length of stay after major cardiac surgery. Further work is needed to determine the responsiveness of PA to interventions aimed at reversing frailty.

Bioelectrical Impedance Analysis-Derived Phase Angle Predicts Protein-Energy Wasting in Maintenance Hemodialysis

Rong-shao Tan, Dan-hua Liang, Yan Liu, Xiao-shi Zhong, Dong-sheng Zhang, Jing Ma

Journal of Renal Nutrition

Volume 29, No 4, pp 295-301, Jul 2019

ABSTRACT

Objective(s)

To explore the validity of using bioelectrical impedance analysis (BIA)-derived 50 kHz phase angle (PhA) in predicting protein–energy wasting (PEW) in Chinese maintenance hemodialysis (MHD) patients.

Design and Methods

The design was a cross-sectional study. A total of 173 of MHD patients and 173 healthy adults were enrolled in the study. The prevalence of PEW in patients was performed by the International Society of Renal Nutrition and Metabolism criteria. The PhA, body cell mass, fat mass, body fat percentage, fat-free mass, and extracellular water/total body water were measured by InBody S10 body composition analyzer. The biochemical indices and anthropometric measurements were assessed using the way published elsewhere. The PhA, other values of BIA and its relationship with age, visceral protein, anthropometric measurements of the MHD patients were compared with the healthy group. The independent variables for predicting PEW and its cutoff values were explored using logistic regression model and receiver operating characteristic curve analysis, respectively.

Results

The MHD patients' PhA value was significantly lower than the healthy group ($4.89^{\circ} \pm 1.19$ vs. $6.32^{\circ} \pm 2.23$, $P < .01$). A total of 34.1% MHD patients with PEW had significantly lower PhA values compared with well-nourished patients ($P < .05$). The PhA decreased more significantly with age in MHD ($r = -0.35$, $P < .001$), compared with controls ($r = -0.26$, $P < .001$). The PhA values were positively associated with nutritional indices related to serum albumin, prealbumin, fat-free mass, and mid-arm muscle circumference. PhA values were not associated significantly with fat mass and body fat percentage ($P > .05$). Multivariate logistic regression analysis showed that PhA and body mass index were independent predictors of PEW, but the PhA was the stronger predictor (odds ratio=4.48, $P < .05$). Receiver operating characteristic curve analysis suggested that the optimal PhA cutoff value to predict PEW was 4.6° .

Conclusion

BIA-derived PhA appears to be a useful bioelectrical marker for predicting PEW in Chinese hemodialysis patients with a cutoff value of 4.6° .

Phase Angle as a Biomarker for Frailty and Postoperative Mortality: The BICS Study

Jung-ho Shin, Chae Rim Kim, Ki Hyun Park, Jin Ho Hwang, Su Hyun Kim

Nutrition

Vol 41, Pages 7-13, Sep 2017

ABSTRACT

Objective

Protein–energy wasting is common in patients on hemodialysis and is an independent risk factor for adverse events. The aim of this study was to retrospectively investigate whether phase angle (PA), known as a nutritional marker, can predict various clinical outcomes in patients with end-stage renal disease (ESRD) who are receiving hemodialysis.

Methods

Using bioelectrical impedance analysis (BIA), PA was obtained every 6 mo, and patients were divided into two groups according to baseline PA: group A included patients with $PA \geq 4.5^\circ$, and group B included patients with $PA < 4.5^\circ$.

Results

We followed 142 patients for a median of 29 mo (12–42 mo). We found that a decrease in PA was associated with an increased risk for death that persisted after adjusting for age, sex, and comorbidities (hazard ratio [HR], 0.56; 95% confidence interval [CI], 0.33–0.97). Cardiovascular events were not associated with PA ($P = 0.685$). We found that PA predicted the occurrence of infection, independent of age, sex, and comorbidities (HR, 0.65; 95% CI, 0.45–0.94). Although levels of hemoglobin did not differ between groups during the study period, patients in group B received higher doses of erythropoiesis-stimulating agents and intravenous iron than those in group A ($P = 0.004$ and 0.044 , respectively). In longitudinal analyses, we did not find increases in PA over time in patients who had a mean dialysis adequacy ≥ 1.4 , daily protein catabolic rate ≥ 1.2 g/kg, or total carbon dioxide level ≥ 22 mmol/L.

Conclusions

PA assessed in a simple manner using BIA provides practical information to predict clinical outcomes in ESRD patients on maintenance hemodialysis.

Bioelectrical impedance analysis values as markers to predict severity in critically ill patients

Yeon HeeLee, Jung-Dong Lee, Dae Ryong Kang, Jeong Hong, Jae-myeong Lee

Journal of Critical Care

Volume 40, Pages 103-107, Aug 2017

ABSTRACT

Purpose

We investigated bioelectrical impedance analysis (BIA)-derived parameters in critically ill patients to evaluate any differences between survivors and nonsurvivors.

Methods

We calculated severity scores for 241 critically ill surgical patients (161 male and 80 female; mean age, 62.9 years) using three severity scoring systems (Acute Physiology and Chronic Health Evaluation II, Sequential Organ Failure Assessment, and Simplified Acute Physiology Score III). Body composition was measured using a portable BIA device for segmental BIA.

Results

Among the BIA values, impedance (odds ratio [OR], 0.99; $P < 0.001$), reactance (OR 0.90; $P < 0.001$), and phase angle (PhA) (OR, 0.53; $P < 0.001$) were highly statistically significant for predicting mortality in univariate and multivariate logistic regression analysis. Comparison of area under the curve (AUC) between severity scoring systems and BIA values showed statistically significant differences between reactance and PhA with all three severity scoring systems. Covariate-adjusted receiver operating characteristic curve analysis showed that compared with severity scoring, all three BIA values (impedance, reactance, and PhA) had higher AUC values.

Conclusions

PhA, impedance, and reactance determined by BIA in critically ill patients were associated with mortality outcomes and revealed stronger predictive power for mortality than severity scoring systems commonly used in an intensive care unit.

Phase angle in the assessment of intensive outpatient treatment of primary lower limb lymphedema

Jose Maria Pereira de Godoy, Esteban Ignacio Fortuny, Henrique Jose Pereira de Godoy, Maria de Fatima Guerreiro Godoy

Journal Phlebology and Lymphology
Vol 10, Issue 1, P12-14, Dec 2017

ABSTRACT

Introduction

Lymphedema is a clinical condition resulting from the accumulation of macromolecules in the interstitial space that leads to an accumulation of fluids.

Objective

The aim of this study was to evaluate changes in the phase angle during the intensive treatment of primary lymphedema of the lower limbs.

Methods

Using the phase angle of bio impedance, the intensive clinical treatment of primary lower limb lymphedema was evaluated at the Clínica Godoy in 2013 and 2014. The participants were 15 male and 40 female patients with a mean age of 40.43 years (range: 25-73; median: 37 years). Only patients with stage II and III primary lymphedema were included in this study; patients with stage I lymphedema and those with edema due to other causes were excluded. Diagnosis was based on patient history and physical examination. Patients were submitted to intensive treatment consisting of 8 hours/day of Mechanical Lymphatic Therapy – lymph drainage using an electromechanical device that performs ankle flexion and extension – together with 15 minutes of cervical stimulation and a grosgrain stocking alternated with elastic bandages as compression therapy. The phase angle was evaluated using the InBody S10 bio impedance apparatus before and after five days of treatment at frequencies of 5, 50 and 250 kHz. The Kruskal-Wallis and all pairwise comparisons (Conover-Inman) tests were used for statistical analysis with an alpha error of 5% being considered acceptable.

Results

Significant improvements in the phase angle were detected at all frequencies (Kruskal-Wallis: p-value <0.005).

Conclusion

The cellular pattern of lymph edematous limbs as evaluated by the phase angle of bio impedance improves with the treatment of lymphedema.

Evaluation of skeletal muscle mass indices, assessed by bioelectrical impedance, as indicators of insulin resistance in patients with type 2 diabetes.

Yoshikazu Hirasaw, Ryosuke Matsuki, Toshihiko Ebisu, Takeshi Kurose, Yoshiyuki Hamamoto, Yutaka Seino

Journal of Physical Therapy Science

Volume 29, No 4, pp 295-301, Jul 2019

ABSTRACT

Purpose

This study aimed to investigate the association between two skeletal muscle mass indices and insulin resistance, and to determine the skeletal muscle mass index that is beneficial in evaluating insulin resistance in patients with type 2 diabetes mellitus.

Participants and Methods

This study evaluated 136 male and 100 female patients with type 2 diabetes mellitus. The skeletal muscle mass was evaluated by bioelectrical impedance analysis. Two skeletal muscle mass indices were investigated as the appendicular skeletal muscle mass index (appendicular skeletal muscle mass divided by the square of height) and relative total skeletal muscle mass (total skeletal muscle mass as a percent of body weight). The homeostasis model assessment of insulin resistance was used as a marker of insulin resistance. Associations were investigated by grouping the participants according to gender and age (<60 or ≥ 60 years).

Results

The appendicular skeletal muscle mass index was positively associated with the homeostasis model assessment of insulin resistance, except in male patients aged ≥ 60 years, whereas the relative total skeletal muscle mass was significantly inversely associated with the homeostasis model assessment of insulin resistance, in all patient groups. The cutoff values of the relative total skeletal muscle mass for the presence of insulin resistance were 37.9% and 32.5% in male and female patients, respectively.

Conclusion

This finding suggests that relative total skeletal muscle mass may be a better indicator of insulin resistance than appendicular skeletal muscle mass index is, in patients with type 2 diabetes mellitus.

Muscle mass and muscle strength are associated with pre- and post-hospitalization falls in older male inpatients: a longitudinal cohort study.

Jeanine M. Van Ancum, Mirjam Pijnappels, Nini H. Jonkman, Kira Scheerman, Sjors Verlaan, Carel G. M. Meskers, Andrea B. Maier

BMC Geriatrics

Volume 18, Article number: 116 (2018)

ABSTRACT

Background

Low muscle mass and strength are highly prevalent in inpatients. It is acknowledged that low muscle mass and strength are associated with falls in community-dwelling older adults, but it is unknown if these muscle measures are also associated with falls in a population of older inpatients. This study aimed to investigate the association between muscle measures and pre- and post-hospitalization falls in older inpatients.

Methods

An inception cohort of patients aged 70 years and older, admitted to an academic teaching hospital, was included in this study. Muscle mass and hand grip strength were measured at admission using bioelectrical impedance analysis and handheld dynamometry. Pre-hospitalization falls were dichotomized as having had at least one fall in the six months prior to admission. Post-hospitalization falls were dichotomized as having had at least one fall during the three months after discharge. Associations were analysed with logistic regression analysis.

Results

The study cohort comprised 378 inpatients (mean age, SD: 79.7, 6.4 years). Fifty per cent of female and 41% of male patients reported at least one fall prior to hospitalization. Post-hospitalization, 18% of female and 23% of male patients reported at least one fall. Lower muscle mass was associated with post-hospitalization falls, and lower hand grip strength was associated with both pre- and post-hospitalization falls in male, but not in female, patients.

Conclusion

These findings confirm the likely involvement of muscle mass and strength in the occurrence of pre- and post-hospitalization falls in a population of older inpatients, but only in males.

Low relative muscle mass and left ventricular diastolic dysfunction in middle-aged adults

Yoshikazu Hirasaw, Ryosuke Matsuki, Toshihiko Ebisu, Takeshi Kurose, Yoshiyuki Hamamoto, Yutaka Seino

International Journal of Cardiology
Volume 255, Pages 118-123, Mar 2018

ABSTRACT

Objectives

The association between low skeletal muscle mass and left ventricular diastolic dysfunction (LVDD), a predictor of future heart failure, is largely unexplored. We investigated the relationship between relative muscle mass and LVDD.

Methods

We conducted a cross-sectional study in 67,106 Koreans who underwent an echocardiography as part of a comprehensive health examination between January 2012 and December 2014. Skeletal muscle mass index (SMI) [$\text{SMI (\%)} = \text{total skeletal muscle mass (kg)} / \text{body weight (kg)} \times 100$] was estimated using a bioelectrical impedance analyzer. The presence of LVDD was determined using echocardiographic findings.

Results

In 67,106 participants, 19,232 subjects (28.7%) and 1553 subjects (2.3%) had LVDD and left ventricular (LV) hypertrophy, respectively. SMI was positively associated with E/A ratio and septal E', whereas E/E' ratio and LV mass index were negatively associated with SMI. Lower SMI was associated with increased presence of LVDD. In a multivariable-adjusted model controlling for potential confounders including physical activity, insulin resistance, and LV mass, the odds ratios for LVDD in SMI quartiles 1, 2, and 3 compared with quartile 4 were 2.11 (1.97–2.25), 1.79 (1.68–1.90), and 1.45 (1.36–1.55), respectively (P for trend < 0.001).

Conclusions

In a large sample of young and middle-aged Korean adults, low relative muscle mass was independently associated with increased risk of LVDD, indicating an independent role of skeletal muscle mass in the pathogenesis of LVDD.

Sarcopenia is associated with worse recovery of physical function and dysphagia and a lower rate of home discharge in Japanese hospitalized adults undergoing convalescent rehabilitation

Yoshihiro Yoshimura, Hidetaka Wakabayashi, Takahiro Bise, Fumihiko Nagano, Sayuri Shimazu, Ai Shiraishi, Makio Yamaga, Hiroaki Koga

Nutrition

Volume 61, Pages 111-118, May 2019

ABSTRACT

Objective

The aim of this study was to evaluate the effect of sarcopenia on functional outcomes, including activities of daily living (ADLs); dysphagia status; and the rate of home discharge, among hospitalized adults receiving convalescent rehabilitation.

Methods

A retrospective cohort study was conducted with 898 patients newly admitted to in-hospital convalescent rehabilitation wards at a single rehabilitation hospital in Japan. Baseline sarcopenia was diagnosed using muscle mass index and handgrip strength according to the criteria of the European Working Group on Sarcopenia in Older People, with the cutoff values of the Asian Working Group for Sarcopenia. The primary outcome was ADLs, assessed by Functional Independence Measure motor (FIM-motor) score at hospital discharge. The secondary outcomes included dysphagia, assessed by the Food Intake Level Scale (FILS), at discharge, and the rate of home discharge. Three multivariate analyses revealed an association between sarcopenia and the clinical outcomes. Each analysis adjusted for the following confounders: age, sex, time from onset, premorbid ADLs, comorbidities, cognitive level, nutritional status, major drugs, and admission diagnoses.

Results

After enrollment, 795 patients (mean age 74.9 ± 13.2 y; 59% women) were included in the final analysis. Admission diagnoses included stroke ($n = 276$; 34.7%), musculoskeletal disorders ($n = 382$; 48.1%), and hospital-associated deconditioning ($n = 137$; 17.2%). Of the 795 patients examined, 402 (50.6%) had sarcopenia. The multiple linear regression analysis showed that sarcopenia was independently associated with FIM motor score at discharge in patients with all disease types ($\beta = -0.189$ [stroke], -0.240 [musculoskeletal disorders], -0.230 [hospital-associated deconditioning]; all $P < 0.05$), with FILS score at discharge only in patients with musculoskeletal disorders ($\beta = -0.271$, $P < 0.001$), but not in patients with stroke ($\beta = -0.061$, $P = 0.375$) or those with hospital-associated deconditioning ($\beta = -0.131$, $P = 0.070$). The multiple logistic regression analysis showed that sarcopenia was associated with rate of home discharge in all disease types (odds ratio [OR], 0.201; 95% confidence interval [CI], 0.067–0.597 for stroke; OR, 0.242; 95% CI, 0.076–0.772 for musculoskeletal disorders; OR, 0.121; 95% CI, 0.110–0.347 for hospital-associated deconditioning; all $P < 0.05$).

Conclusions

Sarcopenia is associated with worse recovery of ADLs and dysphagia and a lower rate of home discharge in hospitalized adults undergoing convalescent rehabilitation. Early detection of sarcopenia and treatment by rehabilitation nutrition should be implemented in this population.

Decreased Skeletal Muscle Mass and Risk Factors of Sarcopenic Dysphagia: A Prospective Observational Cohort Study.

Keisuke Maeda, Miki Takaki, Junji Akagi

The Journals of Gerontology: Series A
Volume 72, Issue 9, Pages 1290-1294, Sep 2017

ABSTRACT

Background

Dysphagia is a known risk factor for malnutrition and pneumonia. Although sarcopenia is hypothesized to cause dysphagia, its causality remains unclear. Thus, this study aimed to investigate causality and the risk factors for sarcopenic dysphagia.

Methods

We enrolled 95 hospitalized patients aged 65 years or older who had restricted oral intake without dysphagia. The skeletal muscle index and Functional Oral Intake Scale were used to evaluate muscle mass and swallowing ability, respectively. Nutritional status, assessed by body mass index, the Mini Nutritional Assessment-Short Form, and energy intake; activity of daily living, assessed by the Barthel Index; hand-grip strength; duration of oral intake restriction; and cognitive status were measured. Dysphagia (Functional Oral Intake Scale ≤ 5) was determined after 2 months.

Results

The participants' mean age was 83.2 ± 8.0 years; 63% were women. Of the surviving 82 patients, 63 (77%) had sarcopenia and 21 (26%) developed dysphagia, all of whom had sarcopenia ($p = .002$). Most variables were risk factors for dysphagia on univariate analysis. Decreased skeletal muscle index (odds ratio [OR] 24.0, 95% confidence interval [CI] 3.6–159.0, $p = .001$), Barthel Index (OR 12.9, 95% CI 2.1–78.4, $p = .005$), and body mass index (OR 11.4, 95% CI 1.8–70.5, $p = .009$) were independent predictors of dysphagia in the multivariate analysis.

Conclusion

This study provides evidence for sarcopenic dysphagia and its risk factors. Preventive and therapeutic interventions require further study.

Body water balance in hemodialysis patients reflects nutritional, circulatory, and body fluid status

Makoto Ando, Tomota Suminaka, Noriaki Shimada, Kenichiro Asano, Jun-ichi Ono, Kazuaki Jikuya, Seiichi Mochizuki

Journal of Biorheology

Vol 32, Issue 2, Pages 46-55, 2018

ABSTRACT

The ratio of the volumes of extracellular water to total body water (ECW/TBW) obtained by multi-frequency bioelectrical impedance analysis (MF-BIA) indicates body water balance. However, the characteristics of ECW/TBW in hemodialysis (HD) patients have not been fully investigated yet. We evaluated correlations of ECW/TBW with body composition, circulatory and body fluid status, and nutritional status in 60 stable maintenance HD patients using MF-BIA. ECW/TBW increased with increasing age and showed significant positive correlations with volume index (VI), cardiothoracic ratio, and brain natriuretic peptide, all of which are indices of circulatory and body fluid status. Furthermore, there were significant negative correlations between ECW/TBW and serum albumin (Alb), the geriatric nutritional risk index, and the normalized protein catabolic rate, all of which indicate nutritional status. Following multiple regression analysis, the independently related factors for total subjects were age, VI, and Alb. In obese HD patients, ECW/TBW tended to decrease, indicating intravascular dehydration. In conclusion, ECW/TBW in HD patients was shown to increase with age and can reflect circulatory, body fluid, and nutritional status, as well as the difference between predetermined dry weight and "optimal body weight" which may change along with a patient's nutritional status.

Extracellular Water Excess and Increased Self-Reported Fatigue in Chronic Hemodialysis Patients.

Kamonwan Tangvoraphonkchai and Andrew Davenport

Therapeutic Apheresis and Dialysis

Vol 22, Issue 2, Pages 152-159, Apr 2018

ABSTRACT

The ratio of the volumes of extracellular water to total body water (ECW/TBW) obtained by multi-frequency bioelectrical impedance analysis (MF-BIA) indicates body water balance. However, the characteristics of ECW/TBW in hemodialysis (HD) patients have not been fully investigated yet. We evaluated correlations of ECW/TBW with body composition, circulatory and body fluid status, and nutritional status in 60 stable maintenance HD patients using MF-BIA. ECW/TBW increased with increasing age and showed significant positive correlations with volume index (VI), cardiothoracic ratio, and brain natriuretic peptide, all of which are indices of circulatory and body fluid status. Furthermore, there were significant negative correlations between ECW/TBW and serum albumin (Alb), the geriatric nutritional risk index, and the normalized protein catabolic rate, all of which indicate nutritional status. Following multiple regression analysis, the independently related factors for total subjects were age, VI, and Alb. In obese HD patients, ECW/TBW tended to decrease, indicating intravascular dehydration. In conclusion, ECW/TBW in HD patients was shown to increase with age and can reflect circulatory, body fluid, and nutritional status, as well as the difference between predetermined dry weight and "optimal body weight" which may change along with a patient's nutritional status.

Phase Angle Predicts Arterial Stiffness and Vascular Calcification in Peritoneal Dialysis Patients.

Margarida Sarmento-Dias, Carla Santos-Araújo, Rui Póinhos, Bruno Oliveira, Maria Sousa, Liliana Simões-Silva, Isabel Soares-Silva, Flora Correia, Manuel Pestana

Peritoneal Dialysis International
Vol. 37, pp. 451–457, Jan 2017

ABSTRACT

Objectives

Fluid overload (FO) is frequently present in peritoneal dialysis (PD) patients and is associated with markers of malnutrition, inflammation, and atherosclerosis/calcification (MIAC) syndrome. We examined the relationships in stable PD patients between phase angle (PhA) and the spectrum of uremic vasculopathy including vascular calcification and arterial stiffness and between PhA and changes in serum fetuin-A levels.

Methods

Sixty-one stable adult PD patients were evaluated in a cross-sectional study (ST1). Phase angle was measured by multifrequency bioimpedance analysis (InbodyS10, Biospace, Korea) at 50 kHz. Augmentation index (AI), a surrogate marker of arterial stiffness, was assessed by digital pulse amplitude tonometry (Endo PAT, Itamar Medical, Caesarea, Israel). Vascular calcification was assessed by simplified calcification score (SCS). Serum fetuin-A levels were measured by ELISA (Thermo scientific; Waltham, MA, USA). Serum albumin was used as a nutritional marker, and serum C-reactive protein (CRP) was used as an inflammatory marker. The same assessments were carried out longitudinally (ST2) in the first 33 patients who completed 1 year of evaluation in ST1.

Results

In ST1, patients with PhA < 6° had higher CRP levels, AI, and SCS and lower serum albumin and fetuin-A levels, in comparison with patients with PhA ≥ 6°. In addition, PhA was a predictor of both AI ($\beta = -0.351$, $p = 0.023$) and SCS ≥ 3 (EXP (B) = 0.243, $p = 0.005$). In ST2, the increase of PhA over time was associated with decreases in both AI ($r = -0.378$, $p = 0.042$) and CRP levels ($r = -0.426$, $p = 0.021$), as well as with the increase in serum fetuin-A levels ($r = 0.411$, $p = 0.030$).

Conclusions

Phase angle predicts both arterial stiffness and vascular calcification in stable PD patients.

Monitoring Volume Status Using Bioelectrical Impedance Analysis in Chronic Hemodialysis Patients.

Chae Kim, Jung-ho Shin, Jin Hwang, Su Kim

ASAIO Journal.

64(2):245–252, MARCH/APRIL 2018

ABSTRACT

Fluid overload can be an independent risk factor of cardiovascular events and all-cause death in end-stage renal disease (ESRD) patients on chronic hemodialysis. We performed a retrospective study to investigate whether intermittent control of fluid status decreases the rate of these complications using bioelectrical impedance analysis (BIA). In ESRD patients on chronic hemodialysis, we identified the ratio of extracellular water to total body water (ECW/TBW) every 6 months using InBody S10 (Biospace, Seoul, Korea), which was measured within 30 minutes after dialysis initiation on the first dialysis day of the week. The uncontrolled group included 57 (40.1%) patients with all ECW/TBW measurements ≥ 0.40 ; in contrast, the controlled group included 85 (59.9%) with any measured ECW/TBW < 0.40 . Included patients were followed for 29 (12–42) months. The risk of cardiovascular events was higher in the uncontrolled group (hazard ratio [HR], 2.4; 95% confidence interval [CI], 1.2–5.1; $p < 0.05$) than it was in the controlled group; however, this difference disappeared after adjusting for age, sex, and Charlson comorbidity index (not significant). On the other hand, the patients in the uncontrolled group had a higher risk of all-cause death than did those in the controlled group, independent of age, sex, and Charlson comorbidity index (HR, 4.7; 95% CI, 1.4–16.1; $p < 0.05$). In conclusion, monitoring volume status using BIA may help to predict all-cause death in chronic hemodialysis patients. Further controlled studies are needed to confirm that strict volume control could reduce the rates of cardiovascular events and mortality in this population.

Do Pre-Hemodialysis Estimates of Extracellular Volume Excess Using Bioimpedance and N-Terminal Brain Natriuretic Peptide Correlate With Cardiac Chamber Size Measured by Magnetic Resonance Imaging?

Suree Yoowannakul, Tushar Kotecha, Marianna Fontana, Andrew Davenport

Therapeutic Apheresis and Dialysis

Vol. 23, Issue 4, Pages 362-368, Aug 2019

ABSTRACT

Bioimpedance can be used to measure extracellular water (ECW) and total body water in hemodialysis (HD) patients and estimate ECW excess. However, ECW excess potentially includes both an increase in the plasma volume and also the extravascular volume. Overestimating the amount of fluid to be removed during HD risks intra-dialytic hypotension. We wished to determine the association between estimates of ECW excess comparing several different equations using bioimpedance, brain N-terminal pro-brain natriuretic peptide (NT-proBNP) with cardiac chamber volumes and function as determined by cardiac magnetic resonance imaging pre-HD measurements of ECW and total body water were made using multifrequency bioimpedance and cardiac chamber sizes and function were determined by magnetic resonance imaging. Thirty patients, 20 males (66.7%), mean age 64.4 ± 15.3 years were studied. ECW and ECW/height were positively associated with indexed right ventricular end-systolic (RVESVi) and end-diastolic volume (RVEDVi) (RVESi $r = 0.46$, $r = 0.43$; RVEDi $r = 0.50$, $r = 0.44$, all $P < 0.05$), but not with left sided cardiac volumes. Whereas NT-proBNP was associated with indexed left atrial and ventricular size ($r = 0.47$, $r = 0.58$, $P < 0.05$), but not right sided cardiac volumes. Pre-HD NT-proBNP was associated with left sided cardiac chamber sizes, but not with right sided chamber sizes, whereas ECW/height was associated with right sided cardiac chamber sizes. As right-sided cardiac chamber size is more responsive to and reflective of changes in intravascular volume than the left atrium and ventricle, then bioimpedance measured ECW is potentially more reliable in estimating plasma volume expansion.

Bioelectrical impedance analysis of body composition and survival in patients with heart failure.

Elizabeth Thomas, Pritha P. Gupta, Gregg C. Fonarow, Tamara B. Horwich

Clinical Cardiology

Vol 42, Issue 1, Pages 129-135, Jan 2019

ABSTRACT

Background

Studies have shown that higher body mass index (BMI) is associated with improved prognosis in heart failure (HF), and this is often termed the obesity paradox.

Hypothesis

Analysis of body composition may reveal that muscle mass rather than adipose tissue accounts for the obesity paradox.

Methods

Bioelectrical impedance analysis of body composition in 359 outpatients with HF was performed using an In Body 520 body composition scale (Biospace Inc., California). Body fat and lean mass were indexed by height (m²). The cohort was stratified by median fat and lean mass indexed by height.

Results

The mean age of patients studied was 56 ± 14 ; mean left ventricular ejection fraction was $38 \pm 16\%$. Patients with higher indexed body fat mass had improved 5-year survival over patients with lower indexed body fat mass (90.2% vs 80.1%, $P = 0.008$). There was also improved survival in patients with high vs low indexed lean body mass (89.3% vs 80.9%, $P = 0.036$). On multivariable analysis, higher indexed body fat mass, but not lean body mass, was independently associated with improved survival (HR 0.89, per kg/m² increase in indexed body fat mass, $P = 0.044$); however, this was attenuated after adjustment for diabetes. The combination of low lean with low-fat mass was independently associated with poor prognosis.

Conclusions

Our data suggest that higher fat mass -and to a lesser extent higher lean mass- is associated with improved outcomes in HF. Further investigations of specific components of body composition and outcomes in HF are warranted.

Bioelectrical impedance analysis in the management of heart failure in adult patients with congenital heart disease.

Masaki Sato, Kei Inai, Mikiko Shimizu, Hisashi Sugiyama, Toshio Nakanishi

Congenital Heart Disease

Vol. 14, Issue 2, Pages 167-175, Mar/Apr 2019

ABSTRACT

Objective

The recognition of fluid retention is critical in treating heart failure (HF). Bioelectrical impedance analysis (BIA) is a well-known noninvasive method; however, data on its role in managing patients with congenital heart disease (CHD) are limited. Here, we aimed to clarify the correlation between BIA and HF severity as well as the prognostic value of BIA in adult patients with CHD.

Design

This prospective single-center study included 170 patients with CHD admitted between 2013 and 2015. We evaluated BIA parameters (intra- and extracellular water, protein, and mineral levels, edema index [EI, extracellular water-to-total body water ratio]), laboratory values, and HF-related admission prevalence.

Results

Patients with New York Heart Association (NYHA) functional classes III-IV had a higher EI than those with NYHA classes I-II (mean \pm SD, 0.398 ± 0.011 vs 0.384 ± 0.017 , $P < .001$). EI was significantly correlated with brain natriuretic peptide level ($r = 0.51$, $P < .001$). During the mean follow-up period of 7.1 months, Kaplan-Meier analysis showed that a discharge EI > 0.386 , the median value in the present study, was significantly associated with a future increased risk of HF-related admission (HR = 4.15, 95% CI = 1.70 - 11.58, $P < .001$). A body weight reduction during hospitalization was also related to EI reduction.

Conclusions

EI determined using BIA could be a useful marker for HF severity that could predict future HF-related admissions in adult patients with CHD.

Sarcopenia in adults with congenital heart disease: Nutritional status, dietary intake, and resistance training

Yumi Shiina, Noriko Matsumoto, Daisuke Okamura, Yuta Takahashi, Yasufumi Kijima, Terunobu Fukuda, Naoto Kawamatsu, Yosuke Nishihata, Nobuyuki Komiyama, Koichiro Niwa

Journal of Cardiology

Volume 74, Issue 1, Pages 84–89, Jul 2019

ABSTRACT

Background

This study aimed (1) to assess the nutritional status and dietary intake, (2) compare the body composition and nutritional intake between sarcopenia and non-sarcopenia, and (3) evaluate the effects of resistance training and amino acid intake in adults with congenital heart disease (CHD).

Methods

Study 1 In total, 172 adults with CHD were prospectively enrolled. The Food Frequency Questionnaire was used, and body composition analysis was conducted. Study 2: Thirty of 172 adult patients with CHD were divided into two groups: amino acid intake plus resistance training (group A) and amino acid intake only (group B) for 2 months.

Results

Study 1: Skeletal muscle mass index was lower in adults with CHD compared to healthy Japanese. Calorie, protein, and fat intake in adults with CHD was higher than those in the National Nutritive Intake Investigation; however, the difference in carbohydrate or salt intake was non-significant. Study 2: In adults with CHD in group A, body fat percentage, edema index, and N-terminal prohormone of brain natriuretic peptide improved, and body weight, skeletal muscle mass index, and basic metabolism increased after the intervention. There was no improvement after intervention for group B.

Conclusions

According to this study, adults with CHD have higher calorie, protein, and fat intake than those in a national survey despite decreased skeletal muscle mass. Amino acid intake plus resistance training positively improved body fat percentage, skeletal muscle mass, and edema in adults with CHD. Appropriate nutritional education and resistance training guidelines should be provided.

Viscus fat area contributes to the Framingham 10-year general cardiovascular disease risk in patients with type 2 diabetes mellitus

Lan Xu, Ping Song, Jin Xu, Haiqing Zhang, Chunxiao Yu, Qingbo Guan, Meng Zhao, Xu Zhang

Life Sciences

Vol. 220, Pages 69-75, Mar 2019

ABSTRACT

Objective

To explore the correlation of the viscus fat area (VFA) with the Framingham 10-year general cardiovascular disease risk in patients with type 2 diabetes mellitus (T2DM).

Methods

A total of 202 patients with T2DM were divided into two groups based on VFA (a VFA $\geq 100 \text{ cm}^2$ group and a VFA $< 100 \text{ cm}^2$ group), or four groups based on sex and age (a middle-aged male group, an elderly male group, a middle-aged female group, and an elderly female group). The correlation between the Framingham 10-year general cardiovascular disease risk and body fat indexes was analyzed.

Results

Patients in the VFA $\geq 100 \text{ cm}^2$ group had higher body fat indexes and Framingham Risk Scores (FRSs) and lower levels of high density lipoprotein-cholesterol (HDL-C) when compared to the VFA $< 100 \text{ cm}^2$ group ($P < 0.05$). Female patients had higher body fat mass (BFM) and body fat percentage (BFP) levels and a lower VFA when compared to male patients. The VFA was significantly higher in the elderly than in the middle-aged patients. The waist hip fat ratio (WHFR) was significantly higher in elderly females than in elderly males ($P < 0.05$). Elderly females had the highest FRS of all patients. Multiple stepwise regression analysis revealed the VFA as a contributor to the Framingham 10-year general cardiovascular disease risk after statistical correction for other multiple factors affecting cardiovascular disease risk.

Conclusion

The VFA is an independent factor that contributes to the Framingham 10-year general cardiovascular disease risk in patients with T2DM.

Bioelectrical Impedance Phase Angle—Predictor of Blood Transfusion in Cardiac Surgery

Donata Ringaitiene, Lina Puodziukaite, Vaidas Vicka, Dalia Gineityte, Mindaugas Serpytis, Jurate Sipylaite

Journal of Cardiothoracic and Vascular Anesthesia
Volume 33, Issue 4, Pages 969-975, Apr 2019

ABSTRACT

Objective

To determine whether bioelectrical impedance-derived phase angle (PA) can be a predictor of red blood cell (RBC) transfusion in patients undergoing cardiac surgery.

Design

An observational retrospective study of prospectively collected data.

Setting

Single center, tertiary referral university hospital.

Participants

The study sample comprised 642 adult patients undergoing elective cardiac surgery.

Interventions

Patient demographic and clinical variables were collected. The body composition of the patients was evaluated by bioelectrical impedance analysis (BIA) the day prior to surgery. The rates of postoperative RBC transfusion were recorded.

Measurements and Main Results

Among the 642 patients (67.8% men, median age of 66 [range 59-73]) included in the present study, 210 (32.7%) received at least 1 RBC unit postoperatively. Hypertension, preoperative stroke, renal failure, preoperative hemoglobin and hematocrit values, BIA-derived PA, aortic crossclamp time, and cardiopulmonary bypass (CPB) time were associated with the risk of RBC transfusion in the univariate analysis, and were included in the final multivariate regression model. Preoperative stroke (odds ratio [OR] 0.394; 95% confidence interval [CI]: 0.183-0.848; $p = 0.017$), preoperative hemoglobin values (OR 0.943; 95% CI: 0.928-0.960; $p < 0.001$), PA <15th percentile (OR 2.326; 95% CI: 1.351-4.000; $p = 0.002$), and CPB time (OR 1.013; 95% CI: 1.008-1.018; $p < 0.001$) were identified as independent predictors of RBC transfusion.

Conclusion

Several factors were identified to be associated significantly with postoperative RBC transfusion in patients undergoing cardiac surgery. Among the conventional predictors, the value of the BIA-derived PA was indicated as a potent prognostic tool.

Bioelectrical Impedance Analysis of Water Reduction in Lower-Limb Lymphedema by Lymphaticovenular Anastomosis.

Yoshichika Yasunaga, Daisuke Yanagisawa, Erika Ohata, Kiyoshi Matsuo, Shunsuke Yuzuriha

Journal of Reconstructive Microsurgery
Vol. 35, Issue 04, Pages 306-314, 2019

ABSTRACT

Background

Although lymphedema is fundamentally abnormal accumulation of excess water in the extracellular space, previous studies have evaluated the efficacy of physiological bypass surgery (lymphaticovenular anastomosis [LVA]) for lymphedema without measuring water volume. This study clarified the water reductive effect of LVA using bioelectrical impedance analysis (BIA).

Methods

The efficacy of LVA for unilateral lower-limb lymphedema was evaluated using BIA in a retrospective cohort. The water volume of affected and unaffected legs was measured using multifrequency BIA before and after LVA. Preoperative measurements were undertaken after compression therapy for at least 3 months. The follow-up period after LVA was a minimum of 6 months.

Results

Thirty consecutive patients with unilateral lower-limb lymphedema were enrolled. The mean water volume reduction of the affected leg by LVA (Δ LBW) was 0.86 L (standard deviation [SD]: 0.86, median: 0.65) with a mean number of 3.3 anastomoses (SD: 1.7). The mean reduction rate of edema was 45.1% (SD: 36.3). Multiple linear regression analysis revealed water volume difference between the affected and unaffected legs before LVA (excess LBW) as the strongest predictor of Δ LBW ($R^2 = 0.759$, $p < 0.01$; $\beta = 0.500$, $p < 0.01$).

Conclusion

The LVA reduces the volume of accumulated body water in lower-limb lymphedema. As excess LBW most strongly predicted the amount of water volume reduction by LVA, body water volume measurement by BIA before LVA might identify patients with low excess LBW not expected to benefit from LVA, regardless of apparent differences in limb circumference.

Diagnostic Accuracy of Clinical Measures Considering Segmental Tissue Composition and Volume Changes of Breast Cancer-Related Lymphedema.

Eun Joo Yang, Seoung Yeon Kim, Woo Hyung Lee, Jae-Young Lim, Jaebong Lee

Lymphatic Research and Biology
Volume 16, Number 4, 2018

ABSTRACT

Background

If we use only volumetry for measuring lymphedema, we could underdiagnose lymphedema with characteristics of biomechanical changes without definite volume change, especially in the medial forearm.

Methods and Results

In total, 158 breast cancer patients participated in this study. Arm volume was measured by water displacement volumetry, and segmental volumes were calculated from circumferences by using the truncated cone method. Subcutaneous ultrasound echogenicities were assessed on the medial side of the upper arm and forearm of both arms and graded by subcutaneous echogenicity grade (SEG) and revised SEG (rSEG). The standards for diagnosing secondary lymphedema were according to the volume change and clinical stage. Sensitivity, specificity, receiver-operating characteristic (ROC) curve, and area under the curve (AUC) were used. Analysis of ROC curves yielded AUCs of 0.875-0.933 ($p < 0.001$). Volume differences in each segment were significantly different among the grades by SEG. The highest AUC was found for volume difference (AUC = 0.919, 95% confidence interval [CI] = 0.860-0.978) in the upper arm near the elbow; however, in the medial forearm, the highest AUC was found for rSEG (AUC = 0.948, 95% CI = 0.923-0.965 in the proximal forearm; AUC = 0.940, 95% CI = 0.923-0.965 in the distal forearm).

Conclusion

Our findings support the use of SEG by ultrasound in the assessment of lymphedema, especially in the medial region of the forearm. Subcutaneous ultrasound echogenicities may improve the accuracy of diagnosis of lymphedema in the forearm.

Lymphedema in patients in different BMI ranges and therapeutic response to intensive treatment

Jose Maria Pereira de Godoy, Henrique Jose Pereira de Godoy, Ana Carolina Pereira de Godoy, Maria de Fatima Guerreiro Godoy

International Journal of Medical Science and Diagnosis Research
Vol. 2, Issue 6, Pages 11-18, Nov-Dec 2018

ABSTRACT

The aim of the present study was to evaluate the therapeutic response to intensive treatment for lymphedema in different body mass index (BMI) ranges (25 to 30, 30 to 40 and > 40 kg/m²). A cross-sectional study was conducted involving 59 patients with grade III lower limb lymphedema (elephantiasis) who arrived consecutively at the Godoy Clinic in São Jose do Rio Preto, Brazil. The diagnosis was based on the clinical history, physical examination as well as intracellular and extracellular volumes, which were determined using electrical bioimpedance analysis (InBody S10 device). Statistical analysis involved the paired t-test and Kruskal-Wallis test with the Conover-Inman post hoc test, considering an alpha error of 5%.

Results

Significant increases in intracellular and extracellular water were detected with the increase in BMI range. Intensive treatment led to significant reductions in intracellular and extracellular water in all BMI ranges, with the exception of intracellular water in the 25-to-30 kg/m² range.

The Effect of Branched Chain Amino Acids-Enriched Nutritional Supplements on Activities of Daily Living and Muscle Mass in Inpatients with Gait Impairments: A Randomized Controlled Trial.

M. Moriwaki, H. Wakabayashi, K. Sakata, K. Domen

The journal of nutrition, health & aging
Volume 23, Issue 4, pp 348–353, Apr 2019

ABSTRACT

Objective

To investigate the effects of continuous intervention with branched chain amino acids-enriched nutritional supplements from the acute phase to convalescent rehabilitation wards in inpatients with gait impairments.

Design

Open-label, randomized, parallel-group comparison study (UMIN Clinical Trials Registry ID: UMIN000018640).

Setting

Acute care and convalescent rehabilitation wards

Participants

We studied 80 patients undergoing stand/gait training.

Interventions

Participants in the intervention group (RJ group) received nutritional supplements (jelly foods comprising 2500 mg BCAA and 20 IU vitamin D) twice a day until hospital discharge.

Measurements

The primary outcome was the motor components of the Functional Independence Measure (FIM-m), and the secondary outcome was skeletal muscle mass index.

Results

Analyses were conducted on 55 patients who were able to perform stand/gait training continuously from the acute until the recovery phases. FIM-m was significantly elevated in the RJ group and the control group, but no difference was noted between the two groups. Only the RJ group showed a significant increase in skeletal muscle mass index, and the amount of variation was significantly different between the two groups (the control group decreased an average of 2.2% and the RJ group increased an average of 4.3%; $P = 0.014$). A significant decrease in body weight was found only in the control group ($P = 0.084$).

Conclusions

Nutritional interventions using branched chain amino acids (BCAA)-enriched nutritional supplements demonstrated no significant difference in activities of daily living; however, an increase in skeletal muscle mass was noted. Skeletal muscle mass and body weight differed significantly between the two groups, and BCAA-enriched nutritional supplements intake in acute and convalescent rehabilitation wards may be effective for the prevention of malnutrition and sarcopenia.

Trimodal prehabilitation for colorectal surgery attenuates post-surgical losses in lean body mass A pooled analysis of randomized controlled trials.

Chelsia Gillis, T anis R. Fenton, Tolulope T. Sajobi, Enrico Maria Minnella, Rashami Awasthi, Sarah-Ève Loiselle, A Sender Liberman, Barry Stein, Patrick Charlebois, Francesco Carli

Clinical Nutrition

Vol. 38, Issue 3, Pages 1053-1060, Jun 2019

ABSTRACT

Background & aims

Preservation of lean body mass is an important cancer care objective. The capacity for prehabilitation interventions to modulate the lean body mass (LBM) of colorectal cancer patients before and after surgery is unknown.

Methods

A pooled analysis of two randomized controlled trials of trimodal prehabilitation vs. trimodal rehabilitation at a single university-affiliated tertiary center employing Enhanced Recovery After Surgery (ERAS) care was conducted. The prehabilitation interventions included exercise, nutrition, and anxiety-reduction elements that began approximately four weeks before surgery and continued for eight weeks after surgery. The rehabilitation interventions were identical to the prehabilitation interventions but were initiated only after surgery. Body composition, measured using multifrequency bioelectrical impedance analysis, was recorded at baseline, pre-surgery, 4 and 8 weeks after surgery. The primary outcome was change in LBM before and after colorectal surgery for cancer. A mixed effects regression model was used to estimate changes in body mass and body composition over time controlling for age, sex, baseline body mass index (BMI), baseline six-minute walk test (6MWT), and postoperative compliance to the interventions. NCT02586701 & NCT01356264.

Results

Pooled data included 76 patients who followed prehabilitation and 63 patients who followed rehabilitation (n = 139). Neither group experienced changes in preoperative LBM. Compared to rehabilitated patients, prehabilitated patients had significantly more absolute and relative LBM at four and eight-weeks post-surgery in models controlling for age, sex, baseline BMI, baseline 6MWT, and compliance to the postoperative intervention.

Conclusion

Trimodal prehabilitation attenuated the post-surgical LBM loss compared to the loss observed in patients who received the rehabilitation intervention. Patients who receive neither intervention (i.e., standard of care) would be likely to lose more LBM. Offering a prehabilitation program to colorectal cancer patients awaiting resection is a useful strategy to mitigate the impact of the surgical stress response on lean tissue in an ERAS setting, and, in turn, might have a positive impact on the cancer care course.

Systemic Inflammation in the Recovery Stage of Stroke: Its Association with Sarcopenia and Poor Functional Rehabilitation Outcomes

Yoshihiro Yoshimura, Takahiro Bise, Fumihiko Nagano, Sayuri Shimazu, Ai Shiraishi, Makio Yamaga, Hiroaki Koga

Progress in Rehabilitation Medicine

Volume 23, Issue 4, pp 348–353, Apr 2019

ABSTRACT

Objective

The aim of our study was to investigate how systemic inflammation relates to sarcopenia and its impact on functional outcomes in the recovery stages of stroke.

Methods

A retrospective cohort study was performed in consecutive patients admitted to convalescent rehabilitation wards following stroke. Patients with acute or chronic high-grade inflammatory diseases were excluded. Systemic inflammation was evaluated using the modified Glasgow Prognostic Score (mGPS). Sarcopenia was defined as a loss of skeletal muscle mass and decreased muscle strength, with the cut-off values set by the Asian Working Group for Sarcopenia. The primary outcome was the motor domain of the Functional Independence Measure (FIM-motor). Univariate and multivariate analyses were used to determine whether mGPS was associated with sarcopenia and FIM-motor at discharge.

Results

The study included 204 patients (mean age 74.1 years, 109 men). mGPS scores of 0, 1, and 2 were assigned to 149 (73.0%), 40 (19.6%), and 13 (6.4%) patients, respectively. Sarcopenia was diagnosed in 81 (39.7%) patients and was independently associated with stroke history (odds ratio [OR] 1.890, $P=0.027$), premorbid modified Rankin scale (OR 1.520, $P=0.040$), body mass index (OR 0.858, $P=0.022$), and mGPS score (OR 1.380, $P=0.021$). Furthermore, the mGPS score was independently associated with sarcopenia (OR 1.380, $P=0.021$) and FIM-motor at discharge ($\beta=-0.131$, $P=0.031$).

Conclusion

Systemic inflammation is closely associated with sarcopenia and poor functional outcomes in the recovery stage of stroke. Early detection of systemic inflammation and sarcopenia can help promote both adequate exercise and nutritional support to restore muscle mass and improve post-stroke functional recovery.

The effects of strength exercise and walking on lumbar function, pain level, and body composition in chronic back pain patients

Jung-Seok Lee and Suh-Jung Kang

Journal of Exercise Rehabilitation

Vol. 12, Issue 5, Pages 463-470, Oct 2016

ABSTRACT

The beneficial effects of a strength exercise program and a combined exercise program of strength training plus walking were examined in overweight with chronic back pain patients. The participants were randomly placed in the strength exercise group (SEG, n=15), combined exercise group (CEG, n=15), and control group (CG, n=6). All subjects performed exercise twice per week, 50 min per session with a professional instructors for 12 weeks. In order to evaluate exercise intervention effects, lumbar function was measured by back strength and flexibility. Roland-Morris disability questionnaire (RMDQ) and visual analogue scale (VAS) were used to evaluate pain level. Fat and muscle mass were measured to compare body composition changes. All measurements were performed before and after 12 weeks of exercise program. Lumbar function: Back strength was significantly different over time, and significant time×group differences were found between SEG and CG and, CEG and CG. Pain disorder degree: VAS showed a significant group difference, and significant time×group differences were shown between SEG and CG, and CEG and CG. Also, RMDG showed a significant difference between CEG and CG. Body composition: Fat mass was significantly different over time×group between SEG and CG. In conclusion, participating in strength and walking exercises were beneficial to improve lumbar function. Also, the combined exercise program was more effective for reducing pain levels than the strength exercise. Finally, fat mass was reduced in this study and this may play a possible role in the improvement of lumbar function and reduction in low back pain.

Clinical Relevance of Different Handgrip Strength Indexes and Mobility Limitation in the Elderly Adults.

Renwei Dong, Xiuyang Wang, Qi Guo, Jiazhong Wang, Wen Zhang, Suxing Shen, Peipei Han, Yixuan Ma, Li Kang, Menglu Wang, Liyuan Fu, Liye Jia, Liancheng Wang, Kaijun Niu

The Journals of Gerontology

Volume 71, Issue 1, Pages 96–102, Jan 2016

ABSTRACT

Background

More efficient clinical indexes are needed to identify older people most likely to present mobility impairments. The aim of the present study was to determine which handgrip strength (HS) indexes are clinically relevant to detect risk of mobility limitation in the elderly adults. In addition, we attempted to determine an optimal cutoff point for the most relevant index.

Methods

Data are from 469 men and 609 women aged 60 years and older recruited in the Hangu area of Tianjin, China. Participants scoring in the top 20% on the Timed Up and Go Test or in the slowest 20% for the 4-m walk test were defined as having mobility limitation.

Results

The prevalence of mobility limitation was 27.6% in women and 24.5% in men. The area under the receiver-operating characteristic curve for HS/body fat mass was 0.723 (95% confidence interval [CI] = 0.658–0.788) in men and for HS/weight was 0.684 (95% CI = 0.628–0.739) in women. These values were indicated higher levels of mobility limitation compared with HS and other relative HS indexes. The cutoffs of the most relevant index in men and women that effectively identified individuals at risk of mobility limitation were 1.884 and 0.281, respectively.

Conclusion

HS/body fat mass and HS/weight appear to be the indices best associated with mobility limitation for men and women, respectively. Optimal cutoffs for clinically relevant index have the potential to identify elderly adults at risk of mobility limitation.

Early Intensive Nutrition Intervention with Dietary Counseling and Oral Nutrition Supplement Prevents Weight Loss in Patients with Advanced Lung Cancer Receiving Chemotherapy: A Clinical Prospective Study

Natsumi Tanaka, Kenichi Takeda, Yuji Kawasaki, Kohei Yamane, Yasuhiko Teruya, Masahiro Kodani, Tadashi Igishi, Akira Yamasaki

Yonago Acta Medica

Vol. 61, Issue 4, Pages 204-212, Dec 2018

ABSTRACT

Background

Weight loss in patients with cancer is caused by cancer cachexia and chemotherapy-induced nausea and vomiting (CINV). Recent developments in antiemetic drugs have substantially improved CINV, but nutritional intervention did not improve body weight. This study aimed to investigate the effects of nutrition intervention with appropriate antiemetic treatment in patients with non-small-cell lung cancer during chemotherapy.

Methods

Patients received individualized nutrition counseling by a registered dietitian and were provided with oral supplements for 90 days. Body weight and other parameters were measured at baseline and after 90-day intervention. To evaluate this nutrition intervention, patients were also retrospectively set as control, and then body weight change was compared with inverse probability of treatment weights (IPTW) analysis.

Results

Ten patients received individualized nutrition counseling and were provided with oral supplements for 90 days. Of them, 7 patients consumed nutritional supplements, and the mean intake was 130 kcal/day. After 90-day intervention, the patients did not show significant weight and BMI loss during the course of cytotoxic chemotherapy. A total of 38 patients were retrospectively enrolled as controls. The number of the patients who gain the body weight after 90 days in the study cohort was significantly larger than that in the retrospective controls with the IPTW analysis (Odds Ratio (OR) = 8.4; 95% Confidence Interval (CI): 1.6 - 42; P = 0.01).

Conclusion

Early intensive nutrition intervention with appropriate antiemetic treatment prevents weight loss. Nutrition interventions might be also beneficial for quality of life, treatment response and survival.

Clinical Benefit of Preoperative Exercise and Nutritional Therapy for Patients Undergoing Hepato-Pancreato-Biliary Surgeries for Malignancy.

Hiroki Nakajima, Yukihiro Yokoyama, Takayuki Inoue, Motoki Nagaya, Yota Mizuno, Izumi Kadono, Kimitoshi Nishiwaki, Yoshihiro Nishida, Masato Nagino

Annals of Surgical Oncology

Volume 26, Issue 1, pp 264–272, Jan 2019

ABSTRACT

Background

The impact of prehabilitation on physical fitness and postoperative course after hepato-pancreato-biliary (HPB) surgeries for malignancy is unknown. The current study aimed to investigate the effect of preoperative exercise and nutritional therapies on nutritional status, physical fitness, and postoperative outcomes of patients undergoing an invasive HPB surgery for malignancy.

Methods

Patients who underwent open abdominal surgeries for HPB malignancies (major hepatectomy, pancreatoduodenectomy, or hepato-pancreatoduodenectomy) between 2016 and 2017 were subjected to prehabilitation. Patients before the introduction of prehabilitation were included as historical control subjects for 1:1 propensity score-matching (no-prehabilitation group). The preoperative nutritional status and postoperative course were compared between the two groups.

Results

The prehabilitation group consisted of 76 patients scheduled to undergo HPB surgeries for malignancy. An identical number of patients were selected as the no-prehabilitation group after propensity score-matching. During the waiting period, serum albumin levels were significantly deteriorated in the no-prehabilitation group, whereas this index did not deteriorate or even improved in the prehabilitation group. By performing prehabilitation, a 6-min walk distance and total muscle/fat ratio were significantly increased during the waiting period. Although the overall incidence of postoperative complications did not differ between the two groups, the postoperative hospital stay was shorter in the prehabilitation group than in the no-prehabilitation group (median, 23 vs 30 days; $p = 0.045$).

Conclusion

The introduction of prehabilitation prevented nutritional deterioration, improved physical fitness before surgery, and shortened the postoperative hospital stay for the patients undergoing HPB surgeries for malignancy.

Effect of Personalized Nutritional Counseling on the Nutritional Status of Hemodialysis Patients

In-Young Jo, Woo Jeong Kim, Hyeong Cheon Park, Hoon Young Choi, Jung Eun Lee, and Song Mi Lee

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ABSTRACT

This study set out to evaluate the impact of personalized nutritional counseling (PNC) on the nutritional status of hemodialysis (HD) patients. This was an intervention study for 10 months at 2 hospitals. Anthropometric, biochemical, dietary, and body composition parameters were measured at baseline and after 3 and 6 months of PNC. A total of 42 patients (23 men and 19 women) were included. Intake of dietary protein, serum albumin, and cholesterol levels had increased significantly from baseline to month 6 ($p < 0.05$). Among the bioelectrical impedance analysis (BIA) parameters, both the body cell mass (BCM) and the fat free mass (FFM) had significantly reduced at month 3 compared to baseline ($p < 0.05$). However, there was no difference between baseline and month 6. We assessed the nutritional status of the subjects using the malnutrition inflammation score (MIS), and divided them into an adequately nourished (AN) and a malnourished (MN) group at baseline. In the subgroup analysis, serum levels of albumin and cholesterol had increased significantly, particularly from baseline to month 6 in the MN group ($p < 0.05$). This study suggests that consecutive PNC contributed to the improvement of the protein intake, serum levels of albumin, cholesterol and to the delay of muscle wasting, which could also have a positive impact on the nutritional status, particularly in malnourished patients receiving HD treatment.

Body Composition Changes After Very-Low-Calorie Ketogenic Diet in Obesity Evaluated by 3 Standardized Methods.

Diego Gomez-Arbelaez, Diego Bellido, Ana I. Castro, Lucia Ordoñez-Mayan, Jose Carreira, Cristobal Galban, Miguel A. Martinez-Olmos, Ana B. Crujeiras, Ignacio Sajoux, Felipe F. Casanueva

The Journal of Clinical Endocrinology & Metabolism
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ABSTRACT

Context

Common concerns when using low-calorie diets as a treatment for obesity are the reduction in fat-free mass, mostly muscular mass, that occurs together with the fat mass (FM) loss, and determining the best methodologies to evaluate body composition changes.

Objective

This study aimed to evaluate the very-low-calorie ketogenic (VLCK) diet-induced changes in body composition of obese patients and to compare 3 different methodologies used to evaluate those changes.

Design

Twenty obese patients followed a VLCK diet for 4 months. Body composition assessment was performed by dual-energy X-ray absorptiometry (DXA), multifrequency bioelectrical impedance (MF-BIA), and air displacement plethysmography (ADP) techniques. Muscular strength was also assessed. Measurements were performed at 4 points matched with the ketotic phases (basal, maximum ketosis, ketosis declining, and out of ketosis).

Results

After 4 months the VLCK diet induced a -20.2 ± 4.5 kg weight loss, at expenses of reductions in fat mass (FM) of -16.5 ± 5.1 kg (DXA), -18.2 ± 5.8 kg (MF-BIA), and -17.7 ± 9.9 kg (ADP). A substantial decrease was also observed in the visceral FM. The mild but marked reduction in fat-free mass occurred at maximum ketosis, primarily as a result of changes in total body water, and was recovered thereafter. No changes in muscle strength were observed. A strong correlation was evidenced between the 3 methods of assessing body composition.

Conclusion

The VLCK diet-induced weight loss was mainly at the expense of FM and visceral mass; muscle mass and strength were preserved. Of the 3 body composition techniques used, the MF-BIA method seems more convenient in the clinical setting.

Nutritional Status and Body Composition in Korean Myopathy Patients

Soo Yun Jang, Seong-Woong Kang, Won Ah Choi, Jang Woo Lee, Mi Ri Suh, Song Mi Lee, Yoo Kyoung Park

Clinical Nutrition Research

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ABSTRACT

This study set out to evaluate the impact of personalized nutritional counseling (PNC) on the nutritional status of hemodialysis (HD) patients. This was an intervention study for 10 months at 2 hospitals. Anthropometric, biochemical, dietary, and body composition parameters were measured at baseline and after 3 and 6 months of PNC. A total of 42 patients (23 men and 19 women) were included. Intake of dietary protein, serum albumin, and cholesterol levels had increased significantly from baseline to month 6 ($p < 0.05$). Among the bioelectrical impedance analysis (BIA) parameters, both the body cell mass (BCM) and the fat free mass (FFM) had significantly reduced at month 3 compared to baseline ($p < 0.05$). However, there was no difference between baseline and month 6. We assessed the nutritional status of the subjects using the malnutrition inflammation score (MIS), and divided them into an adequately nourished (AN) and a malnourished (MN) group at baseline. In the subgroup analysis, serum levels of albumin and cholesterol had increased significantly, particularly from baseline to month 6 in the MN group ($p < 0.05$). This study suggests that consecutive PNC contributed to the improvement of the protein intake, serum levels of albumin, cholesterol and to the delay of muscle wasting, which could also have a positive impact on the nutritional status, particularly in malnourished patients receiving HD treatment.

Effect of Early Full-Calorie Nutrition Support Following Esophagectomy: A Randomized Controlled Trial.

Wei Wu, Ming Zhong, Du-ming Zhu, Jie-qiong Song, Jun-feng Huang, Qun Wang, Li-jie Tan

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ABSTRACT

Background

Early use of enteral nutrition (EN) is indicated following surgical resection of esophageal cancer. However, early EN support does not always meet the optimal calorie or protein requirements, and the benefits of supplementary parenteral nutrition (PN) remain unclear. We aimed to evaluate the efficacy and safety of early supplementary PN following esophagectomy.

Materials and Methods

We enrolled 80 consecutive patients who underwent esophagectomy. Resting energy expenditure and body composition measurements were performed in all patients preoperatively and postoperatively. EN was administered after surgery, followed by randomization to either EN+PN or EN alone. The amount of PN administered was calculated to meet the full calorie requirement, as measured by indirect calorimetry, and 1.5 g protein/kg fat-free mass (FFM) per day was added as determined by body composition measurement. The clinical characteristics were compared between the 2 groups.

Results

Patients in the EN+PN group but not in the EN group preserved body weight (0.18 ± 3.38 kg vs -2.15 ± 3.19 kg, $P < .05$) and FFM (1.46 ± 2.97 kg vs -2.08 ± 4.16 kg) relative to preoperative measurements. Length of hospital stay, postoperative morbidity rates, and standard blood biochemistry profiles were similar. However, scores for physical functioning (71.5 ± 24.3 vs 60.4 ± 27.4 , $P < .05$) and energy/fatigue (62.9 ± 19.5 vs 54.2 ± 23.5 , $P < .05$) were higher in the EN+PN group 90 days following surgery.

Conclusion

Early use of supplemental PN to meet full calorie requirements of patients who underwent esophagectomy led to better quality of life 3 months after surgery. Moreover, increased calorie and protein supplies were associated with preservation of body weight and FFM.

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Prepared by: Lisa Cha (Clinical Team, InBody HQ)

Approved by: Hyunju Shin (Head of Clinical Team, InBody HQ)