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Baseline higher peritoneal transport had been associated with worse nutritional status of incident continuous ambulatory peritoneal dialysis patients in Southern China

Yun Liu, Rong Huang, Qunying Guo, Qiongqiong Yang, Chunyan Yi, Jianxiong Lin, Xueqing Yu and Xiao Yang

British Journal of Nutrition

ABSTRACT

The aim of the present study was to investigate the relationship between baseline peritoneal transport types and nutritional status in Chinese continuous ambulatory peritoneal dialysis (CAPD) patients. In the present single-centre, prospective study, incident CAPD patients were included from 15 April 2010 to 31 December 2011 and were followed up for 12 months. According to the results of baseline peritoneal equilibration test, patients were divided into lower peritoneal transport group (lower transporters) and higher peritoneal transport group (higher transporters). Nutritional status was evaluated by both subjective global assessment (SGA) and protein-energy wasting (PEW) score. The body composition parameters were assessed by body impedance analysis. A total of 283 CAPD patients were included in the study, of which 171 (60.4%) were males with a mean age of 47.0(SD=14.9) years. Compared with lower transporters (n=92), higher transporters (n=181) had lower levels of serum albumin (37.1 (SD=4.3) v. 39.6 (SD=4.3)g/l, P<0.001), serum pre-albumin (356 (SD=99) v. 384 (SD=90) mg/l, P=0.035), phase angle (6.15(SD=0.39)° v. 6.27(SD=0.47)°, P=0.05) and higher rate of malnutrition defined by SGA(52.5 v. 25.0%, P<0.001) and PEW score (37.0 v. 14.1%, P<0.001) at 1-year of follow-up. Baseline higher peritoneal transport, analysed by multivariate binary logistic regressions, was independently associated with malnutrition (SGA mild to moderate and severe malnutrition: OR=3.43, 95% CI 1.69-6.96, P<0.01; PEW: OR=2.40, 95% CI 1.08-5.31, P=0.03). It was concluded that baseline higher peritoneal transport was independently associated with worse nutritional status of CAPD patients in Southern China.
Comparison of hydration and nutritional status between young and elderly hemodialysis patients through bioimpedance analysis

Jung Eun Lee, In Young Jo, Song Mi Lee, Woo Jeong Kim, Hoon Young Choi, Sung Kyu Ha, Hyung Jong Kim, Hyeong Cheon Park

Clinical Interventions in Aging
Volume 13, Issue 10, pp 1327-1334, Aug 2015

ABSTRACT

Background: The number of elderly people on dialysis is increasing rapidly. Fluid overload and malnutrition status are serious problems in elderly dialysis patients. We aimed to compare the hydration and nutritional status through bioimpedance analysis (BIA) between young and elderly hemodialysis (HD) patients and to analyze risk factors related to fluid overload and malnutrition status in these patients.

Method: We conducted a cross-sectional study, in which 82 HD (males 42, mean age 58.7±12.9 years) patients were enrolled. We collected different types of data: laboratory data, such as serum creatinine, albumin, total iron-binding capacity, hemoglobin, total cholesterol; anthropometric data, such as hand grip strength (HGS); BIA data, such as intracellular water, skeletal muscle mass, body cell mass, bone mineral content, phase angle (PhA), extra cellular water (ECW)/total body water (TBW) ratio; and malnutrition-inflammation score (MIS), which is a traditional nutritional parameter for dialysis patients. All patients were stratified into two groups according to their age: young (< 65 years [n=54]) and elderly (≥ 65 years [n=28]).

Results: Total iron-binding capacity and HGS were significantly lower in elderly HD patients than in young HD patients (198.9±35.6 vs 221.4±52.1 mcg/dL; and 22.4±10.3 vs 36.4±23.2 kg, respectively) (P<0.05). Also, intracellular water and PhA measured by BIA were significantly lower (18.3±4.0 vs 20.3±4.2 L [P=0.043]; and 4.0±1.0 vs 4.9±1.2° [P=0.002], respectively), and ECW/TBW were higher in elderly HD patients (0.40±0.01 vs 0.39±0.01 [P=0.001]). ECW/TBW was positively associated with age (P<0.001) and the presence of diabetes (P<0.001) and was negatively associated with sex (P=0.001), albumin (P<0.001), urine volume (P=0.042), HGS (P<0.001), and PhA by BIA (P<0.001). MIS was negatively related to sex (P=0.001), albumin (P<0.001), HGS (P=0.001), and PhA (P<0.001) in HD patients. On multivariate analysis, older age (P=0.031), the presence of diabetes (P=0.035), and decreased PhA (P<0.001) were inde-pendent risk factors for increased ECW/TBW, representative of fluid overload status, whereas only decreased PhA (P=0.008) was a significant factor for MIS, representative of malnutrition status in these HD patients.

Conclusion: We found that fluid overload and malnutrition status were more common in elderly HD patients compared with young HD patients. PhA was a significant independent factor in fluid overload status and malnutrition in these HD patients. Thus, our results indicated that PhA assessed by BIA might be a clinically useful method for assessing nutritional and hydration status in elderly HD patients.
젊은 투석환자(<65yrs)와 고령의 투석환자(≥65yrs)들간의 생체 임피던스 분석을 통한 수분 및 영양상태를 비교하기 위해 InBody S10을 이용하여 한국의 투석환자 82명을 대상으로 측정하였다. 생화학 자표, 신체계측 데이터를 수집하였고, 영양상태 평가는 단백질 에너지 소모 평가로, malnutrition-inflammation score (MIS)를 사용하였다.
고령 환자의 phase angle은 젊은 환자들에 비해 유의하게 낮았다(4.0±1.0˚와 4.9±1.2˚, respectively; p=0.002). 연령과 phase angle은 유의한 반비례 관계를 보였다(r=-0.481, p<0.001). 세포외수분비와 위험요인의 회귀분석 시, 단변량 분석에서 연령, 성별, 당뇨, 당뇨병, 소변량, 악력, phase angle이 유의한 연관성을 보였고, 다변량 분석에서는 연령, 당뇨, phase angle이 유의한 연관성을 보였다. MIS와 위험요인의 회귀분석 시, 단변량 분석에서 단백질, 악력, phase angle이 유의한 연관성을 보였고, 다변량 분석에서는 phase angle만 유의한 연관성을 보였다.
체액과잉과 영양불량 상태는 고령 환자에게 더 흔하며 phase angle은 이러한 상태를 반영하는 유의한 독립인자이므로, InBody로 측정한 phase angle은 고령 투석환자의 영양상태와 수화상태를 평가하는 유용한 지표일 수 있다.
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
Volume 5, Pages 43-54, 2016

ABSTRACT

In myopathy patients, fat mass increases as the disease progresses, while lean body mass decreases. The present study aimed to investigate the overall nutritional status of Korean myopathy patients through surveys of diet and dietary habits, bioelectrical impedance analysis (BIA), and biochemistry tests, as well as the examination of related factors, for the purpose of using such findings as a basis for improving the nutritional status in myopathy patients. The energy intake of all participants was found to be insufficient at only 44.5% of Dietary Reference Intakes for Koreans 2010 (KDRIs 2010), whereas protein intake was sufficient at 89.8% of KDRIs 2010. Dietary fiber intake was found to be 58.4% of sufficient dietary fiber intake for adults according to KDRIs 2010. Calcium intake was found to be 55.0% and magnesium was 14.9% of the recommended calcium and magnesium intake for adults according to KDRIs 2010. With respect to quality of life (QOL), overall increase in QOL domain score showed significant positive correlations with vegetable fat intake \( p < 0.05 \), vegetable protein intake \( p < 0.05 \), and dietary fiber intake \( p < 0.05 \). With respect to BIA, the mean phage angle of all participants was found to be \( 2.49 \pm 0.93^\circ \), which was below the cutoff value. As a study that examined nutrient analysis and dietary habits of myopathy patients in Korea, the present study is meaningful in providing the basic data for future studies that aim to present dietary guidelines for patients suffering from myopathy.

한국의 근육병 환자들의 전반적인 영양상태를 알아보고자, \textit{InBody S10}을 사용하여 BIA를 실시하였다. 10세 이상의 근육병 환자 75명을 대상으로 하였고, 대상자들은 10-19세, 20-29세, 30-39세, 40세 이상의 4 그룹으로 나뉘어졌다. 일반적 특성, 식사습관을 묻는 설문조사와 영양평가, 생화학 검사가 함께 진행되었다.

대상자들의 BMI와 phase angle은 반비례 관계를 보였고 \( r=-0.288 \), \( p<0.05 \), 총 단백질은 phase angle와 비례관계 \( r=0.235 \), \( p<0.05 \)를 보였다. 보통 사람들의 phase angle은 3-15°의 범위를 보이는데, 본 연구의 각 그룹의 수치와 전체 대상자의 평균은 2.49±0.93°로 cutoff 미만으로 나타났다. 대상자들의 영양상태 평가에서는 에너지, 식이섬유, 칼슘, 마그네슘 섭취량이 섭취 기준에 비해 부족하였다.

결론적으로, phase angle은 근육병의 심각성을 반영하기 때문에, 인바디의 phase angle을 이용한 영양평가는 근육병 환자들의 영양관리에 유용하게 활용될 수 있다.
Use of bioimpedance analysis for nutritional treatment in critically Ill patients

Yeon Hee Lee and Jae Myeong Lee

Journal of Clinical Nutrition
Volume 7, Issue 1, Pages 9-14, 2015

ABSTRACT

Patients in the intensive care unit (ICU) easily have large amounts of extracellular fluids, such as edema or ascites, because of cardiovascular instability under septic conditions and also have high risk of malnutrition while staying in the ICU. Traditional nutritional assessment parameters like body mass index have a limitation in ICU patients due to muscle atrophy and decrease of lean body mass. Bioimpedence analyses (BIA) can be used to assess body composition and are useful in performance of nutritional assessments in ICU patients. BIA can simply and noninvasively estimate body composition (total body water, extracellular water, intracellular water, body cell mass, and free fat mass etc.) by sending a weak electric current through the body. In particular, phase angle (PhA, phase difference between the voltage applied to the impedance and the current driven through it), one of the parameters of BIA, is related to cell membrane integrity or cell size. Low PhA can possibly imply malnutrition and PhA has been reported as a useful indicator of clinical outcomes or prognosis of severe patients. Additional study with clinical application of BIA in ICU patients is needed in order to confirm the usefulness of BIA.

BIA는 비침습적이고 간단한 검사방법으로 건강한 사람과 환자에게 두루 적용이 가능한 체조성 분석 방법이다. 하지만 BIA를 활용한 여러 선행 연구들에서 BIA 측정값과 환자의 영양상태 및 질병의 예후나 생존율이 높은 연관성을 보였음에도 불구하고 체액불균형, 낮은 신뢰도, 기준치 부족 등으로 인해 실제 환자에게서 적용은 활발하지 않은 상태이다. 그러나 앞으로 부위별 BIA와 다주파수 생체전기저항분석을 이용하여 체액불균형 상태의 환자나 복수 환자 등 다양한 환자군에서 총 체수분량과 체세포량 및 phase angle 등의 측정값을 도출하여 이를 영양치료에 적용하고 더 나아가 영양 상태 및 질병의 예후 평가에도 활용할 수 있을 것으로 기대된다.
Use of multifrequency bioimpedance analysis in male Patients with acute kidney injury who are undergoing continuous veno-venous hemodiafiltration

Harin Rhee, Keum Sook Jang, Min Ji Shin, Jang Won Lee, Il Young Kim, Sang, Heon Song, Dong Won Lee, Soo Bong Lee, Ihm Soo Kwak, Eun Young Seong

PLoS One
Volume 10, Issue 7, Jul 2015

ABSTRACT

Introduction: Fluid overload is a well-known predictor of mortality in patients with acute kidney injury (AKI). Multifrequency bioimpedance analysis (MF-BIA) is a promising tool for quantifying volume status. However, few studies have analyzed the effect of MF-BIA-defined volume status on the mortality of critically ill patients with AKI. This retrospective medical research study aimed to investigate this issue.

Methods: We retrospectively reviewed the medical records of patients with AKI who underwent continuous veno-venous hemodiafiltration (CVVHDF) from Jan. 2013 to Feb. 2014. Female patients were excluded to control for sex-based differences. Volume status was measured using MF-BIA (Inbody S20, Seoul, Korea) at the time of CVVHDF initiation, and volume parameters were adjusted with height squared (H²). Binary logistic regression analyses were performed to test independent factors for prediction of in-hospital mortality.

Results: A total of 208 male patients were included in this study. The mean age was 65.19±12.90 years. During the mean ICU stay of 18.29±27.48 days, 40.4% of the patients died. The in-hospital mortality rate increased with increasing total body water (TBW)/H² quartile. In the multivariable analyses, increased TBW/H² (OR=1.312(1.009-1.705), p=0.043) and having lower serum albumin (OR=0.564(0.346-0.919, p=0.022) were independently associated with higher in-hospital mortality. When the intracellular water (ICW)/H² or extracellular water (ECW)/H² was adjusted instead of the TBW/H², only excess ICW/H² was independently associated with increased mortality (OR=1.561(1.012-2.408, p=0.044).

Conclusions: MF-BIA-defined excess TBW/H² and ICW/H² are independently associated with higher in-hospital mortality in male patients with AKI undergoing CVVHDF.
An analysis of age-related loss of skeletal muscle mass and its significance on osteoarthritis in a Korean population

Hun-Tae Kim, Hyun-Je Kim, Hee-Yun Ahn, Young-Hoon Hong

The Korean Journal of Internal Medicine

ABSTRACT

Background/Aims: This study was conducted in order to analyze the effects of sarcopenia on age-related osteoarthritis (OA) of the knee in a Korean population.

Methods: All the Korean subjects who visited the Yeungnam University Medical Center Health Promotion Center between 2008 and 2012 in order to undergo a routine medical examination were enrolled. A total of 5,723 young, healthy people (2,959 males, 2,764 females) enrolled as normal subjects and 23,473 subjects (13,006 males and 10,467 females) were included for evaluation of the effects of sarcopenia on OA. There were 266 subjects who followed-up bioelectrical impedance analysis at a 4-year interval. Of 327 subjects enrolled in this study, knees with anteroposterior X-rays were assessed according to the Kellgren-Lawrence (K/L) grade.

Results: Skeletal muscle mass index (SMI) and basal metabolic rate (BMR) showed a steady decrease with the advance of age (p < 0.01), but SMI showed strong positive correlation with BMR (r = 0.72, β = 30.96, p < 0.01). During the 4-year interval, BMR showed a significant decrease with aging (p < 0.01), consistently with the decrease of SMI. Knees with normal SMI were prone to be designated as K/L grade 0 or 1; however, subjects with sarcopenia showed a trend toward the higher K/L grade, classified as knee radiological osteoarthritis (ROA) (p < 0.01).

Conclusions: The results of this study may indicate that sarcopenia as age-related loss of skeletal muscle mass is interactively correlated with the presence and severity of age-related OA.

한국의 건강한 성인 5,723명과 OA (osteoarthritis, 골관절염) 환자 23,473명을 대상으로 노화로 인한 무릎 골관절염에 있어 사르코페니아의 영향을 분석하였다. 대상자들은 4년 간격으로 F/U하여, InBody720 으로 골격근량을 측정하였고, Janssen 공식(골격근량/체중 x 100)으로 구한 SMI(%, Skeletal muscle mass index)의 -1SD 미만을 사르코페니아로 정의하였다.

건강한 18-39세의 성인 남녀의 SMI(kg/m², 골격근량/체중2)는 남성이 10.74±1.04 (kg/m²), 여성이 8.22±0.86(kg/m²), SMI(%)는 남성이 43.53±3.55(%), 여성이 37.99±3.19(%)였다. OA 환자들 중에서는 여성(11.7%)이 남성(7.8%)에 비해 사르코페니아의 비율이 더 높았다. F/U까지의 4년 동안 SMI(kg/m²)와 SMI(%)는 유의한 변화가 있어(p<0.01), SMI는 연령의 증가에 따라 감소하는 것으로 나타났다. OA 환자 중, 50세 미만과 50세 이상의 대상자 간의 SMI 변화를 비교한 결과, SMI와 연령은 유의한 관계(r=-0.157, p<0.01)로 여성에서 더욱 뚜렷했다. 연령과 SMI의 회귀분석 결과 SMI는 1년에 0.061%씩 유의하게 감소하며, 여성이 남성에 비해 훨씬 더 유의하게 감소하였다(남 : β=-0.046, p<0.01, 여 : β=-0.085, p<0.01).

결론적으로, 골격근량의 소실은 노화로 인한 OA와 연관이 있다.
Decreased Skeletal Muscle Mass and Risk Factors of Sarcopenic Dysphagia: A Prospective Observational Cohort Study

Keisuke Maeda, Miki Takaki, Junji Akagi

Journals of Gerontology. Series A: Biological Sciences and Medical Sciences Oct 2016

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 = 0.002). Most variables were risk factors for dysphagia on univariate analysis. Decreased skeletal muscle index (odds ratio [CI] 24.0, 95% confidence interval [CI] 3.6–159.0, p = 0.001), Barthel Index (OR=12.9, 95% CI 2.1–78.4, p = 0.005), and body mass index (OR=11.4, 95% CI 1.8–70.5, p = 0.009) 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.

사르코페니아가 연하곤란을 발생시킨다는 가설이 있지만, 이의 인과관계는 불명확하여 본 연구에서는 사르코페니아 연하곤란의 인과관계와 위험 요인에 대해 알아보았다. 일본의 65세이상 고령인 입원환자 82명을 대상으로 InBody S10을 활용하여 골격근량을 측정, 골격근량/신장2으로 SMI를 구하였고, "FOIS를 통해 연하능력을 평가하였다.

82명 중 63명(77%)이 사르코페니아로 진단받았고, 21명(26%)은 연하곤란이 발생하였는데, 연하곤란인 대상자는 모두 사르코페니아이었다(ρ=0.002). 남녀 모두 연하곤란이 있는 그룹의 SMI는 연하곤란이 없는 그룹에 비해 유의하게 낮은 결과를 보였다(남:ρ=0.008, 여:ρ<0.001). 입원 후 60일 간 ROC 커브 분석 결과, SMI의 "AUC는 남성이 0.792, 여성이 0.974로 민감도와 특이도가 높은 결과를 보였다. 가장 정확한 cutoff 값은 여성이 SMI(cutoff value<4.15kg/m², 민감도 : 0.929, 특이도 : 0.865, 정확도 : 0.882)와 약력이었다. 다중회귀분석 결과, 연하곤란의 독립적인 예측요인으로는 낮은 SMI(OR=24.0), "Barthel Index(OR=12.9), BMI(OR=11.4)가 있었다.

본 결과로 SMI가 낮을수록 사르코페니아 연하곤란의 위험이 크다는 것을 확인할 수 있었다.
Muscle Mass Loss Is a Potential Predictor of 90-Day Mortality in Older Adults with Aspiration Pneumonia

Keisuke Maeda, Junji Akagi

Journal of the American Geriatrics Society
Nov 2016

ABSTRACT

Objectives: To investigate the association between loss of muscle mass and aspiration pneumonia (AP).

Design: Prospective observational cohort.

Setting: Acute geriatric hospital.

Participants: Individuals admitted to the hospital for AP (N = 151; mean age 85.9; 49.7% male).

Measurements: Appendicular skeletal muscle index (ASMI; appendicular skeletal muscle mass divided by height squared) was used to evaluate muscle mass. Data on age, sex, body mass index, Mini Nutritional Assessment-Short Form score, Barthel Index score, Charlson Comorbidity Index score, and pneumonia severity (Japanese version of the CURB-65 (C (confusion), U (blood urea nitrogen ≥20 mg/dL), R (respiratory rate ≥30 breaths/min), B (systolic blood pressure <90 mmHg or diastolic blood pressure ≤60 mmHg), 65 (aged ≥65) severity score (A-DROP)) were obtained. Outcomes included 30- and 90-day mortality.

Results: Mild, moderate, severe, and extremely severe AP were observed in 1.3%, 70.2%, 25.8%, and 2.6% of participants, respectively. On Kaplan-Meier analysis, participants in the lowest ASMI quartile for each sex were more likely to die than those in the other quartiles (log-rank test P = 0.005). Multivariate logistic analyses showed that ASMI and A-DROP were independent predictors of 90-day mortality; only A-DROP was a significant predictor of 30-day mortality (P < 0.001). Cox regression analysis also showed that the first ASMI quartile was independently associated with mortality (hazard ratio = 2.19; 95% confidence interval = 1.06-4.52; P = 0.03).

Conclusion: Low muscle mass is a potential predictor of long-term mortality in individuals with AP. Prospectively preventing muscle mass deterioration may be beneficial for recovery from AP in older adults.

AP(Aspiration Pneumonia, 흡인성 폐렴)는 인두강이나 위장으로부터의 세균 흡입으로 발생되며 고령인의 입원과 예후 불량으로 인한 흔한 증상이다. 본 연구에서는 AP가 있는 고령환자의 근육량 소실이 사망의 위험요인이 되는지 알아보았다. AP 치료를 받고 있던 65세 이상 일본의 고령인 168명을 대상으로 InBody S10을 활용하여 사지 굴격근량을 측정하였고, ASMI(사지 근육량/신장² Appendicular skeletal muscle mass index)로 근육량을 평가하였다. 환자의 ASMI는 남성이 5.5±1.1 kg/m², 여성이 4.3±0.9 kg/m²로 아시아 성인의 사르코페니아 진단의 cutoff 값인 남성 7.0kg/m², 여성 5.7kg/m²과 비교하면, 근육량이 매우 낮은 것으로 나타났다. 30일째, 90일째 사망률의 OR을 알기위한 로지스틱 회귀분석 결과, 90일째 ASMI의 OR이 0.64로 사지 근육량이 증분할수록 사망의 위험률을 낮추는 것으로 나타났다. 카플란 마이어 곡선에 의하면, 대상자의 ASMI 분위기 중 가장 낮은 군의 생존률은 더 높은 군들에 비해 유의하게 낮았다(p=0.005). 낮은 근육량은 AP 환자의 잠재기에 걸친 사망률을 예측하는 요인으로, 근육 저하를 예방하는 것은 고령의 AP환자의 회복에 도움이 된다.
Relative appendicular skeletal muscle mass is associated with isokinetic muscle strength and balance in healthy collegiate men

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ABSTRACT

There are few studies on the relationship between skeletal muscle mass and balance in the young ages. We investigated the relationship between appendicular skeletal muscle mass, isokinetic muscle strength of lower extremity, and balance among healthy young men using relative skeletal muscle index. Thirty men were grouped according to relative appendicular skeletal muscle mass index: higher skeletal muscle group (n = 15) and lower skeletal muscle group (n = 15). Static and dynamic balance abilities were measured using the following: a test where participants stood on one leg with eyes closed, a modified Clinical Test of Sensory Interaction on Balance (mCTSIB) with eyes open and eyes closed, a stability test, and limits of stability test. The muscle strength of lower extremities was measured with an isokinetic analyser in hip, knee, and ankle joints. Participants with higher appendicular skeletal muscle mass were significantly more stable in maintaining dynamic balance than those with lower appendicular skeletal muscle mass. Moreover, appendicular skeletal muscle mass index was positively correlated with dynamic balance ability. Participants with higher appendicular skeletal muscle mass had stronger strength in the lower extremity, and there were significant differences in the isokinetic torque ratios between groups. From these results, it can be inferred that higher appendicular skeletal muscle mass relates to muscle strength and the alteration in the peak torque ratio of the lower extremity, contributing to the maintenance of balance.

* mCTSIB : modified clinical test of sensory interaction on balance
The relationship between hepatic steatosis and skeletal muscle mass index in men with type 2 diabetes

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Endocrine Journal

ABSTRACT

Recent cross-sectional studies revealed that sarcopenia is associated with non-alcoholic fatty liver disease (NAFLD) in general population. However, it remains to be elucidated that the association between skeletal muscle mass index (SMI) and hepatic steatosis in patients with type 2 diabetes. In this cross-sectional study of 145 Japanese patients (79 men and 66 women) with type 2 diabetes, we examined the correlation of SMI with hepatic steatosis. Skeletal muscle mass was estimated from bioimpedance analysis measurements and SMI (%) was defined as skeletal muscle mass (kg)/total body weight (kg) × 100. Controlled attenuation parameter (CAP) evaluated with transient elastography, was used for assessment of hepatic steatosis. In addition, we also investigated the association between SMI and prevalence of NAFLD, which was defined as CAP over 237.8 dm⁻¹, using logistic regression analysis. Fifty-eight (74%) men and thirty-nine (60%) women had NAFLD. Multiple regression analysis demonstrated that SMI was independently correlated with CAP (β = -0.35, P = 0.007) in men after adjusting for age, body mass index, hemoglobin A1c, triglycerides/ HDL-C ratio, C-reactive protein and gamma-glutamyl transferase. On the other hand, SMI was not associated with CAP in women. Odds ratio per incremental 1% of SMI for prevalence of NAFLD was 0.80 (95% CI 0.64-0.97, P = 0.021) after adjusting for age, BMI, smoking statues, triglycerides/ HDL-C ratio, HbA1c, and gamma-glutamyl transferase in men. In conclusion, SMI was negatively associated with hepatic steatosis in men with type 2 diabetes.

* CAP : Controlled attenuation parameter. 지방이 초음파에 미치는 영향을 수치화한 값
Association of lower limb muscle mass and energy expenditure with visceral fat mass in healthy men

Shusuke Yagi, Muneyuki Kadota, Kenichi Aihara, Koji Nishikawa, Tomoya Hara, Takayuki Ise, Yuka Ueda, Takashi Iwase, Masashi Akaie, Michio Shimabukuro, Shinsuke Katoh, Masataka Sata

Diabetology & Metabolic Syndrome
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ABSTRACT

Background: A high-calorie diet and physical inactivity, an imbalance between caloric intake and energy consumption, are major causes of metabolic syndrome (MetS), which manifests as accumulation of visceral fat and insulin resistance. However, the lifestyle-related factors associated with visceral fat mass in healthy men are not fully understood.

Methods: We evaluated visceral fat area (VFA), skeletal muscle mass, caloric intake, and energy expenditure in 67 healthy male participants (mean age, 36.9 ± 8.8 years; body mass index 23.4 ± 2.5 kg/m²).

Results: Multiple regression analysis showed that the total skeletal muscle mass (P < 0.001) were negatively and age (P < 0.001) were positively associated with VFA. Lower limb muscle mass (P < 0.001) was strongly associated with VFA. However, total caloric intake, total energy expenditure, and energy expenditure during exercise were not associated with VFA.

Conclusions: Skeletal muscle mass especially lower limb muscle mass negatively contributes to visceral fat mass in healthy men. Therefore, maintaining lower limb muscular fitness through daily activity may be a useful strategy for controlling visceral obesity and metabolic syndrome.
Associations between lower extremity muscle mass and metabolic parameters related to obesity in Japanese obese patients with type 2 diabetes

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PeerJ
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ABSTRACT

Background. Age-related loss of muscle mass (sarcopenia) increases the incidence of obesity in the elderly by reducing physical activity. This sarcopenic obesity may become self-perpetuating, increasing the risks for metabolic syndrome, disability, and mortality. We investigated the associations of two sarcopenic indices, the ratio of lower extremity muscle mass to body weight (L/W ratio) and the ratio of lower extremity muscle mass to upper extremity muscle mass (L/U ratio), with metabolic parameters related to obesity in patients with type 2 diabetes and obesity.

Methods. Of 148 inpatients with type 2 diabetes treated between October 2013 and April 2014, we recruited 26 with obesity but no physical disability. Daily physical activity was measured by a triaxial accelerometer during a period of hospitalization, and which was also evaluated by our previously reported non-exercise activity thermogenesis questionnaire. We measured body composition by bioelectrical impedance and investigated the correlations of L/W and L/U ratios with body weight, body mass index (BMI), waist circumference (WC), waist-to-hip ratio (WHR), visceral fat area, subcutaneous fat area, serum lipid profile, and daily physical activity.

Results. The L/W ratio was significantly and negatively correlated with BMI, WC, WHR, body fat mass, body fat percentage, subcutaneous fat area, and serum free fatty acid concentration, was positively correlated with daily physical activity: the locomotive non-exercise activity thermogenesis score, but was not correlated with visceral fat area. The L/U ratio was significantly and positively correlated with serum high-density lipoprotein cholesterol.

Conclusions. High L/W and L/U ratios, indicative of relatively preserved lower extremity muscle mass, were predictive of improved metabolic parameters related to obesity. Preserved muscle fitness in obesity, especially of the lower extremities, may prevent sarcopenic obesity and lower associated risks for metabolic syndrome and early mortality.

노화에 의한 근육손실은 신체활동을 저하시켜 사르코페니아 비만을 증가시킨다. 본 연구에서는 일본의 제2형 당뇨로 입원중인 환자 148명을 대상으로 InBody720을 활용하여 L/W(lower extremity muscle mass/weight), U/W(upper extremity muscle mass/weight), L/U와 사르코페니아 지표간의 관련성을 조사하였다.

L/W는 BMI, 하리둘레, 체지방량(p<0.002), 체지방률(p<0.001), 피지방단면적, 혈청 유리지방산과 유의한 반비례 관계, U/W는 복부지방률(p=0.009)과 비례(p<0.009), 체지방률과는 반비례 관계를 보였다(p<0.001). L/U는 BMI, 하리둘레, 복부지방률(p<0.001)과 유의한 반비례, HDL과는 유의한 비례관계를 보였다. 높은 L/W와 L/U 즉, 충분한 하지근육 비율은 비만관련 대사지표를 개선하는 예측 요인이고, 사르코페니아 비만을 예방하고 대사증후군 및 조기 사망률을 낮추는 요인일 수 있다.

이러한 당뇨환자의 사르코페니아 비만 평가에 InBody의 상지 및 하지 근육량이 활용되었다.
Measurement of Muscle Strength in Haemodialysis Patients by Pinch and Hand Grip Strength and Comparison to Lean Body Mass Measured by Multifrequency Bio-Electrical Impedance

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Annals of Nutrition and Metabolism

ABSTRACT

Background: Muscle weakness is a risk factor for mortality in haemodialysis (HD) patients; we wished to determine whether measuring the composition of the arm with bioimpedance was associated with arm muscle strength.

Methods: We measured pinch strength (PS) and hand grip strength (HGS) in 250 adult HD patients with corresponding post-dialysis multifrequency bioelectrical assessments with segmental body analysis.

Results: Mean age 64.0 ± 15.6, 66% male and 45.6% diabetic. The maximum HGS in the dominant or non-fistula arm was 18.9 ± 9.2 kg and PS 4.09 ± 1.96 kg respectively, with a correlation of $r = 0.80$, $p < 0.001$. HGS was associated with body cell mass ($\beta = 0.37$, $p < 0.001$) and PS with appendicular muscle mass ($\beta = 0.06$, $p < 0.001$). Both HGS and PS were independently associated with the ratio of extracellular water (ECW) to total body water (TBW); $\beta = -39.5$, $p = 0.024$, $\beta = -44.8$, $p < 0.001$ in the arm. The presence of an arterio-venous fistula increased the ECW/TBW ratio in the arm from 0.383 ± 0.009 to 0.390 ± 0.012, $p < 0.05$.

Conclusion: Muscle strength measured by HGS and PS was associated with both markers of whole body and segmental body composition within the arm, particularly ECW/TBW. Bioimpedance measurements and assessment of muscle strength should be measured in the non-fistula arm.
The influence of anthropometrics on physical employment standard performance

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Occupational Medicine (Lond)

ABSTRACT

Background: The Canadian Armed Forces (CAF) recently implemented the Fitness for Operational Requirements of CAF Employment (FORCE), a new physical employment standard (PES). Data collection throughout development included anthropometric profiles of the CAF.

Aims: To determine if anthropometric measurements and demographic information would predict the performance outcomes of the FORCE and/or Common Military Task Fitness Evaluation (CMTFE).

Methods: We conducted a secondary analysis of data from FORCE research. We obtained bioelectrical impedance and segmental analysis. Statistical analysis included correlation and linear regression analyses.

Results: Among the 668 study subjects, as predicted, any task requiring lifting, pulling or moving of an object was significantly and positively correlated (r > 0.67) to lean body mass (LBM) measurements. LBM correlated with stretcher carry (r = 0.78) and with lifting actions such as sand bag drag (r = 0.77), vehicle extrication (r = 0.71), sand bag fortification (r = 0.68) and sand bag lift time (r = -0.67). The difference between the correlation of dead mass (DM) with task performance compared with LBM was not statistically significant.

Conclusions: DM and LBM can be used in a PES to predict success on military tasks such as casualty evacuation and manual material handling. However, there is no minimum LBM required to perform these tasks successfully. These data direct future research on how we should diversify research participants by anthropometrics, in addition to the traditional demographic variables of gender and age, to highlight potential important adverse impact with PES design. In addition, the results can be used to develop better training regimens to facilitate passing a PES.

Canađ다 군대(CAF, Canadian Armed Forces)는 새로운 신체 체용 기준(PES, physical employment standard)인 CAF 체용요구조건을 위한 평가를 실시하였다. PES를 통과를 가능케 하고, 더 나은 식이요법을 개발하기 위한 정보를 제공하고자, 해군, 육군, 공군 668명(남 384, 여 116)을 대상으로 체력평가를 시행하고, InBody520을 이용하여 체성분을 측정하였다. InBody로 남녀간 5개(상지좌우, 하지좌우, 몸통) 부위의 평균 근육량을 측정하였고, 전체 근육량을 활용하여 PES 통과여부를 평가하였다.
체지방률은 남녀간의 유의한 차이가 없었지만 5개 부위의 근육량간에는 유의한 차이가 있었다(p<0.05). lifting, pulling, moving은 근육량과 유의한 비례관계를 보였고(r>0.67), 근육량은 stretcher carry(SC), sand bag drag(SBD), vehicle extrication(VE), sand bag fortification, sand bag lift time과 상관성을 보였는데, 특히 SC, SBD, VE는 팔근육량(각각 r=0.767, r=0.738, r=0.687)과 가장 상관성이 높았다.
위와같이 군인들의 PES 통과를 위한 트레이닝을 개발하는데 InBody를 통한 전신 및 부위별 근육량이 활용되었다.
Effect of Early Full-Calorie Nutrition Support Following Esophagectomy: A Randomized Controlled Trial

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Journal of Parenteral and Enteral Nutrition
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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 < 0.05) 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 < 0.05) and energy/fatigue (62.9 ± 19.5 vs 54.2 ± 23.5, P < 0.05) 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.

EN(Enteral Nutrition, 경장영양)은 항상 최적의 칼로리나 단백질 요구량을 충족시키는 수는 없고, 보충적인 PN(Parenteral Nutrition, 정맥영양)의 이점은 현재까지 불명확하다. 식도절제술로 초기 PN의 효능과 안전을 평가하기 위해 대한의 식도절제술 환자 80명을 대상으로 InBody720을 이용하여 수술 전과 수술 후 9일째에 제지방량, 체지방량, 세포내액, 세포외액을 측정하였다. 수술 받은 환자들은 수술 후 24시간 동안 모든 EN을 하였고, 그 이후에는 랜덤하게 EN(n=40)과 EN+PN(n=40)의 두 군으로 나누었다. 수술 전과 비교하여 수술 후 EN+PN군의 제지방량은 어느정도 유지(1.46±2.97)된 반면, EN군은 제지방량이 감소(-2.08±4.16)하였다. 체중도 이와 유사한 결과(0.18±3.38kg vs -2.15±3.19kg)가 나타났다. 또한, EN+PN군에서 세포내액, 세포외액 모두 증가하였다. 입원기간, 수술 후 사망률, 생화학적 혈액지표들은 두 군 모두 유사하였으나 신체적 기능, energy/fatigue는 EN+PN군에서 더 높았다. 단변량 회귀분석결과, 환자의 체중, 제지방량, 세포내액, 세포외액의 변화는 신체기능 개선 및 energy/fatigue 점수 개선과 모두 유의한 상관성을 보였다(p<0.001).

보충적인 PN을 일찍 시작할 경우, 충분한 칼로리 요구량을 충족시켜 체중과 제지방량을 유지시키므로 식도암 환자의 수술 후 3개월동안 삶의 질을 개선시킨다.
Efficacy of bioelectrical impedance analysis during the perioperative period in children

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ABSTRACT

We evaluated the efficacy of bioelectrical impedance analysis (BIA) during the perioperative period by estimating the preoperative and postoperative body fluid status. After obtaining informed consent, we enrolled 100 children (3-12 years of age) scheduled for elective surgeries. All children had been fasted preoperatively. The children's body fluid status was estimated using a BIA machine (InBody S10; Biospace, Korea) in the ward on the afternoon before surgery (baseline), just before surgery and immediately after surgery. The total administered fluid volume during the fasting period, total administered fluid volume during the operation and fasting time were recorded. Continuous data are shown as mean ± standard deviation, and Pearson's correlation analysis was used to assess relationships between the preoperative fluid deficit and intracellular water (ICW)/extracellular water (ECW) changes. The mean fasting period was 13.3 h (range 5.8-19.7 h). A weak positive correlation was shown between the ICW and fluid deficit during the fasting period (Pearson correlation coefficient = 0.254; P = 0.010). A stronger positive correlation was shown between the ECW and fluid deficit during the fasting period (Pearson correlation coefficient = 0.359; P < 0.001). The baseline and postoperative ICW showed a strong positive correlation (Pearson correlation coefficient = 0.992, P < 0.001), as did the baseline and postoperative ECW (Pearson correlation coefficient = 0.990, P < 0.001). Also there was no dehydration and irritability on medical recording preoperatively. BIA may be an alternative method for estimating the perioperative fluid status in children and determining details of fluid administration.

BIA 측정이 소아의 수술(이비인후과, 안과, 비뇨기과, 성형외과, 정형외과 수술)기간 동안 총 체수분량, 세포내수분량, 세포외수분량과 같은 hydration 상태를 평가하는데 유용한지 알아보기 위해 3-12세의 한국인 소아 100명을 대상으로 InBody S10을 이용하여 수술 전 free intake 상태(baseline), 수술 전 공복상태, 수술 직후에 누운 자세로 세포내수분량, 세포외수분량을 측정하였다. 수술 전 공복상태에서는 하트만 용액 또는 생리식염수를 투여하였다. 수술 전 평균 공복시간은 13.3시간이었고, 공복시간 동안 투여된 fluid 양은 요구되는 fluid 양보다 훨씬 낮았다(320 vs 934mL).

Baseline상태에서 측정한 세포내수분량과 세포외수분량은 측정량보다 낮은 값이었다(세포내수분량: 10.4 cs 12.6L, 세포외수분량: 6.6 vs 7.9L). 수술 전 공복상태에서는 수액을 공급했음에도 불구하고 평균 세포내수분량과 세포외수분량은 각각 10.4L, 6.5L로 추정값보다는 낮아 일부는 dehydration 상태를 보였다. 세포내수분량은 공복 기간 동안 *체액 부족 상태와 억한 비례관계(Pearson correlation coefficient=0.254, p<0.010), 세포외수분량은 강한 비례관계를 보였다(Pearson correlation coefficient=0.359, p<0.001). 수술 시행동안은 fluid treatment에도 불구하고 일부는 dehydration 상태로 수술 후 세포내수분량과 세포외수분량은 평균 10.5L, 6.5L로 여전히 낮은 상태였다. BIA로 환아들의 체액상태를 평가한 결과, 몇몇 환아들은 수술 전후 기간동안 장기간의 공복상태를 겪어 fluid 공급에도 불구하고 약간의 dehydration 상태를 보였다.

 이를 통해 BIA는 fluid 투여량을 결정하고 소아의 수술 전후에 걸친 체액상태를 평가하는 좋은 대안이 될 수 있음을 보여준다.

* 체액 부족 산출: The fluid deficit during the NPO period was calculated using the fluid replacement volume necessary(hour fluid requirement based on body weight multiply fasting hour) and actual fluid administered during fasting period.
Exploration of Fluid Dynamics in Perioperative Patients Using Bioimpedance Analysis

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Journal of Gastrointestinal Surgery

ABSTRACT

Introduction: Perioperative fluid restriction is advocated to reduce complications after major surgeries. Current methods of monitoring body fluids rely on indirect volume markers that may at times be inadequate. In our study, bioimpedance analysis (BIA) was used to explore fluid dynamics, in terms of intercompartmental shift, of perioperative patients undergoing operation for hepato-pancreato-biliary (HPB) diseases.

Methods: A retrospective review was conducted, examining 36 patients surgically treated for HPB diseases between March 2010 and August 2012. Body fluid compartments were estimated via BIA at baseline (1 day prior to surgery), immediately after surgery, and on postoperative day 1, recording fluid balance during and after procedures. Patients were stratified by net fluid status as balanced (±500 mL) or imbalanced (>550 mL) and outcomes of BIA compared.

Results: Mean net fluid balance volumes in balanced (n = 16) and imbalanced (n = 20) patient subsets were 231.41 ± 155.44 and 1050.18 ± 548.77 mL, respectively. Total body water (TBW) (p = 0.091), extracellular water (ECW) (p = 0.125), ECW/TBW (p = 0.740), and intracellular water (ICW) (p = 0.173) did not fluctuate significantly in fluid-balanced patients. Although TBW (p = 0.069) in fluid-imbalanced patients did not change significantly (relative to baseline), ECW (p = 0.001), ECW/TBW (p = 0.019), and ICW (p = 0.012) showed significant postoperative increases.

Conclusion: The exploration of fluid dynamics using BIA has shown importance of balanced fluid management during perioperative period. Increased ECW/TBW in fluid-imbalanced patients suggests possible causality for the development of ascites or fluid collections during postoperative period in patients undergoing HPB operations.

간해담도(hepato-pancreato-biliary, HPB) 수술환자들의 체액상태를 알아보기 위해 평균연령 59.89±12.73세 한국의 HPB 수술을 받은 환자 36명을 대상으로 InBody S10을 이용하여 총 체수분량, 세포외수분량, 세포내수분량, 세포외수분량을 측정하였다.

환자들 중 체액균형 상태는 16명, 체액불균형 상태는 20명이었다. Baseline에서 체액균형군의 평균 세포외수분량은 0.3802였고, 수술 직후는 0.3767, 수술 후 1일째는 0.3798로 유의한 변화를 보이지 않았지만(p=0.740), 체액불균형군은 baseline에서 평균 세포외수분량은 0.3855, 수술 직후는 0.3884, 수술 후 1일째는 0.3926으로 수술 후 세포외수분량의 유의한 증가를 보였다(p=0.019). 두 군간 비교시 수술 후 1일째에는 세포외수분량만 유의한 차이를 보였다(p=0.028). Clavien-Dindo 분류에 의하면 체액균형군에서는 25%가 합병증이었던 반면, 체액불균형군에서는 70%가 합병증으로 복수(35%)와 체액착적(40%)이 흔한 합병증으로 나타났다.

HPB 수술을 받은 환자중 체액불균형 환자의 세포외수분량 증가는 수술 전후 기간동안 복수 또는 체액착적으로의 진행을 의미하고 있어, InBody의 세포외수분량 측정은 이 환자들의 예후를 평가하는데 신뢰성있는 지표인 것으로 보인다.
Postoperative Changes in Body Composition After Pancreaticoduodenectomy Using Multifrequency Bioelectrical Impedance Analysis

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ABSTRACT

Background: Nutritional status is one of the most important clinical determinants of outcome after surgery. The aim of this study was to compare changes in the body composition of patients undergoing pancreaticoduodenectomy (PD), distal gastrectomy (DG), or total gastrectomy (TG).

Methods: The parameters of body composition were measured using multifrequency bioelectrical impedance analysis with an InBody720 (Biospace Inc. Tokyo, Japan) in 60 patients who had undergone PD (n = 18), DG (n = 30), or TG (n = 12). None of the patients had recurrence or were treated with chemotherapy. Changes between the preoperative data and results and those obtained 12 months after surgery were evaluated.

Results: Twelve months after surgery, the body weight change in the PD group was significantly lower than in the TG and DG groups (-1.2 ± 3.8 vs -7.4 ± 4.4 and -4.0 ± 3.2 kg, respectively; p < 0.01 vs TG, p < 0.05 vs DG). The body weight change correlated with the fat mass change in all groups.

Conclusions: The type and extent of surgery has a different effect on long-term body weight and body composition. Bioelectrical impedance analysis can be used to assess body composition and may be useful for nutritional assessment in patients who have undergone these surgeries.
Adaptive servoventilation versus oxygen therapy for sleep disordered breathing in patients with heart failure: a randomised trial

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ABSTRACT

Background: Both adaptive servoventilation (ASV) and nocturnal oxygen therapy improve sleep disordered breathing (SDB), but their effects on cardiac parameters have not been compared systematically.

Methods and Results: 43 patients with chronic heart failure (CHF; left ventricular ejection fraction (LVEF) ≤50%) with SDB were randomly assigned to undergo ASV (n=19, apnoea hypopnoea index (AHI)=34.2±12.1/h) or oxygen therapy (n=24, 36.9±9.9/h) for 3 months. More than 70% of SDB events in both groups were central apnoeas or hypopnoeas. Although nightly adherence was less for the ASV group than for the oxygen group (4.4±2.0 vs 6.2±1.8 h/day, p<0.01), the improvement in AHI was larger in the ASV group than in the oxygen group (-27.0±11.5 vs -16.5±10.2/h, p<0.01). The N-terminal pro-brain natriuretic peptide (NT-proBNP) level in the ASV group improved significantly after titration (1535±2224 to 1251±2003 pg/mL, p=0.01), but increased slightly at follow-up and this improvement was not sustained (1311±1592 pg/mL, p=0.08). Meanwhile, the level of plasma NT-proBNP in the oxygen group did not show a significant change throughout the study (baseline 1071±1887, titration 980±1913, follow-up 1101±1888 pg/mL, p=0.19). The significant difference in the changes in the NT-proBNP level throughout the study between the 2 groups was not found (p=0.30). Neither group showed significant changes in echocardiographic parameters.

Conclusions: Although ASV produced better resolution of SDB in patients with CHF as compared with oxygen therapy, neither treatment produced a significant improvement in cardiac function in the short term. Although we could not draw a definite conclusion because of the small number of participants, our data do not seem to support the routine use of ASV or oxygen therapy to improve cardiac function in patients with CHF with SDB.
심부전 환자 사망률의 위험요인으로 알려진 수면 호흡장애의 치료에 어떤 산소요법을 사용하는 것이 효과적인지 알아보고, 이것이 체수분과 체성분에 미치는 영향을 알아보기 위해, 일본의 수면 호흡장애가 있는 만성 심부전 환자 20-80세 43명을 대상으로 RCT를 진행하였다. 체성분 분석은 InBody S20을 사용하여 총 체수분량, 세포외수분량, 체지방량, 제지방량을 측정하였다. 환자들은 ASV(n=19) 혹은 산소요법(oxygen therapy)(n=24) 그룹으로 무작위로 나뉘어졌다. 환자들은 이틀 밤 동안 치료를 받았고, 3개월 뒤 밤에 한 번 더 치료를 받았다. 그 결과, AHI는 ASV그룹에서 더 크게 감소하였고, NT-proBNP는 초기에 ASV그룹에서 개선되었지만 계속적으로 유지되지는 못했다. 두 그룹 모두 좌심실 박출률과 심박동 지표에서 유의한 변화가 없어 심장 기능에는 차이가 없었다. 세포외수분량, 총체수분량, 세포외수분비는 두 그룹 모두에서 유의한 변화가 없었지만, 체지방량은 ASV그룹에서 증가하였다.

본 연구에서는 두 가지 산소요법의 심장기능에 대한 유의한 효과 차이를 알 수 없었지만, 체액 균형은 수면 호흡장애, 만성 심부전과 병리학적으로 연관이 깊고, 제지방량의 증가는 만성 심부전 환자들의 긍정적인 예후와 관련이 있다. 따라서, 수면 호흡장애 치료 연구에 InBody를 통한 체성분 분석을 이용할 수 있다.

* ASV: adaptive servoventilation, 양압호흡요법/ AHI: apnea hypopnea index, 무호흡 저호흡 지수/ NT-proBNP: N-terminal pro-brain natriuretic peptide
Edema index measured by bioelectrical impedance analysis as a predictor of fluid reduction needed to remove clinical congestion in acute heart failure

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SUMMARY

Based on the fact that achievement of dry weight without sign of clinical congestion at the time of discharge is considered a surrogate marker of successful treatment in acute heart failure, this study aimed to determine whether BIA could predict the dry weight of acute heart failure patients. InBody S10 was used to measure the ECW ratio (ECW/TBW, extracellular water/total body water) of 60 acute heart failure patients in Japan. The weight before discharge was recorded as the dry weight, and the patients were divided into two groups; those who lost more weight during hospitalization more than the median (4.30kg), and those who lost less.

Mean ECW ratio was 0.400 ± 0.019, and ECW ratio in higher weight reduction group was statistically larger compared with that in lower weight reduction group (0.406 ± 0.021 vs. 0.394 ± 0.015, p = 0.012). Factors such as weight on admission, left ventricular ejection fraction, IVC diameter, and albumin were significantly different between groups. SBP, creatinine, and N-terminal pro-B-type natriuretic peptide were similar between the groups. Multivariate linear regression analysis revealed that male sex, IVC diameter on expiration, ECW ratio, and weight on admission were significant independent predictors of required weight reduction. Model equations for predicting required weight reduction developed are as follows.

[Model equation]

\[
\text{Weight reduction (kg)} = 6.0628 - 2.31 \text{ (if male)} + 0.25 \text{ (IVC-20)} + 100.62 \text{ (EI-0.39)} + 0.13 \text{ (Weight-65)}
\]

*IVC: inferior vena cava/ EI: Edema Index (= ECW ratio = ECW/TBW)

Therefore, ECW ratio is a useful predictor of the amount of weight reduction needed to reach dry weight in acute heart failure treatment. Quantitative assessment of clinical congestion is helpful for avoiding excess volume reduction and persistent congestion in acute heart failure.
급성심부전을 치료하는데 있어 중요한 요인은 퇴원 시 윤혈이 없는 상태에서의 건체중이라는 점에 따라, BIA장비가 급성심부전 환자들의 건체중을 예측할 수 있는지 알아보기 위해 InBody S10을 사용하여 일본의 급성심부전 환자 60명의 ECW ratio(ECW/TBW, extracellular water/total body water, 세포외수분비)를 측정하였다. 건체중은 퇴원 전 기록한 체중으로 설정하였고, 환자들은 입원 중 중간값(4.30kg)보다 체중이 더 많이 감소한 그룹과 더 적게 감소한 그룹으로 나뉘었다.

평균 ECW ratio는 0.400±0.019였고, 높은 체중 감소 그룹은 낮은 체중 감소 그룹에 비해 baseline의 ECW ratio가 유의하게 높았다(0.406±0.021 vs. 0.394±0.015, p=0.012). 입원 시의 체중, 좌심실 박출률, 난소 시 하대정맥 직경, 일부인수치는 그룹 간 유의하게 달랐지만 입원 시의 SBP, creatinine, N-terminal pro-B-type natriuretic peptide는 그룹 간 유의한 차이가 없었다. 다변량 회귀분석 결과, 남성, 난소 시 하대정맥 직경, ECW ratio, 입원 시 체중은 체중 감소 필요량을 예측하는데 유의한 독립변수라는 것을 알 수 있었다. 이에 대한 결과와 방정식은 다음과 같다.

[Multivariate model]
Weight reduction (kg) = 6.0628-2.31 (if male) + 0.25 (IVC-20) + 100.62 (EI-0.39) + 0.13 (Weight-65)
*IVC: inferior vena cava/ EI: Edema Index(=ECW ratio=ECW/TBW)

이와 같이, ECW ratio는 심부전 치료 시 건체중에 도달하기 위해 필요한 체중 감소량을 예측하는데도 도움이 지표임을 알 수 있다. 따라서, InBody로 측정된 ECW ratio는 건체중을 예측하여 심부전 환자의 윤혈과 체액저류를 예방하는데 활용될 수 있다.
Malnutrition assessed by phase angle determines outcomes in low-risk cardiac surgery patients

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ABSTRACT

Background & Aims: Phase angle (PA), which is obtained from bioelectrical impedance analysis (BIA), is a non-invasive method for measuring altered electrical properties of biological tissues. It has been recognised as an objective prognostic marker of disease severity and frailty. The aim of this study is to determine whether PA is a marker of malnutrition and postoperative morbidity in low operative risk patients undergoing cardiac surgery.

Methods: A prospective study was conducted in a tertiary hospital. The nutritional state of the cardiac surgery patients was evaluated using BIA the day before the scheduled surgery. After applying selection criteria, 342 low operative risk patients were selected and classified into two groups in accordance with the PA value: a low PA group and a normal PA group. The correlation between low PA and low fat-free mass index (FFMI), a marker of malnutrition, was assessed. Associations between low PA and adverse postoperative outcomes, defined by the Society of Thoracic Surgeons postoperative risk evaluation model, were analysed. The impact of low PA on length of stay in an ICU and hospital was evaluated.

Results: Low PA was detected in 61 (17.8%) patients in the selected group, which consisted of low operative risk patients with a median Euroscore II value of 1.46 (IQR: 0.97-2.03) and was associated with FFMI with Pearson’s R of 0.515 (p < 0.001). Low PA was associated with higher rates (13 [21.3%] vs. 30 [10.7%] p = 0.023) and risk of postoperative morbidity in univariate regression analysis (OR = 2.27, CI 95% = 1.10-4.66, p = 0.026). Furthermore, low PA persisted as an independent factor in multivariate regression analysis (OR = 2.50, CI 95% 1.18-5.29, p = 0.016) adjusted for preoperative risk factors of postoperative morbidity. Evaluation of hospitalisation length revealed a tendency of a prolonged hospitalisation (>14 days) rate (31 [50.8%] vs. 105 [37.8%), p = 0.063) in the group with low PA.

Conclusion: A low preoperative PA is an indicator of malnutrition and determines adverse outcomes after cardiac surgery. Further research is needed to evaluate clinical applications of the PA, such as a more accurate identification of malnourished cardiac surgery patients.

위상각(PA, Phase Angle)이 심장 수술을 받는 환자들의 영양실조와 수술 후 이환율의 지표가 될 수 있는지 알아보기 위해, 20-79세의 수술 위험이 낮은 환자 342명을 대상으로 InBody S10을 이용하여 위상각과 체성분을 측정하였다. 측정은 수술 하루 전날 실시되었고, 대상자들은 성별과 연령에 따라 아래에서 15th percentile에 해당하는 위상각을 기준으로 낮은 PA, 높은 PA 그룹으로 나누었다.

낮은 PA는 FFMI(fat-free mass index, kg/m² 재지방량 지수)와 상관성이 있었다(r=0.515, p<0.001). 낮은 FFMI는 영양 실조의 지표이다. 수술 후 이환율은 21.3% (높은 PA: 10.7%, p=0.023)였고, 수술 후 이환율의 위험은 2.50배로 나타났다(OR= 2.50, 95% CI 1.18-5.29, p=0.016).

그러므로, 낮은 수술 전 위상각은 영양실조의 지표가 될 수 있으며, 위험이 낮은 심장 수술 후의 임상적 결과를 예측할 수 있다. 이에 따라, InBody는 심장 수술을 받는 환자들의 영양실조와 이환율 평가의 유용한 도구가 될 수 있다.
Clinical relevance of different handgrip strength indexes and mobility limitation in the elderly adults

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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.

Conclusions: 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.

노인의 운동성 저하를 잘 판단할 수 있는 임상적으로 효과적인 HS(handgrip strength, HS) Index를 알아내기 위해, InBody720으로 중국 60세 이상의 노인 1,049명의 체중, 제지방량, 골격근량, 제지방량, 체지방률 등을 측정하였다. HS Index는 HS 대 체성분의 비율로 산출하였다. AUC*를 산출한 결과, 남자는 HS/체지방량이 0.723, 여자는 HS/체중이 0.684로 운동성 저하를 가진 노인에게서 HS와 다른 HS Index보다 높게 나타났다. 각각의 cutoff는 1.884, 0.281이었다. 운동성 저하의 위험도를 산출하기 위해 cutoff를 기준으로 그룹을 나눠, 수면의 질, 우울도, 신체활동, 앉아있는 시간, 앉고 있는 질병 등을 보정하여 OR을 산출한 결과, 남자의 HS/체지방량의 OR은 3.59(95% CI 1.67-7.74), 여자의 HS/체중의 OR은 2.64(95% CI 1.76-4.27)로 HS와 다른 HS Index보다 높았다. 결론적으로, HS보다 체성분과 함께 평가하는 HS Index를 사용하는 것이 운동성 저하에 위험이 있는 노인을 찾아내기 에 적합하다는 것을 알 수 있으며, InBody를 통한 체성분 분석은 노인의 운동성 저하를 예측하는데 활용될 수 있다.

* AUC(area under the receiver-operating characteristic(ROC) curve): 민감도와 특이도를 나타내는 곡선 그래프(ROC curve)의 면적을 말함. 1에 가까울수록 지표의 성능이 좋음을 나타냄.
Long-term effects of cardiac rehabilitation in elderly individuals with stable coronary artery disease

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Disability and Rehabilitation
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ABSTRACT

Purpose: To compare exercise capacity and cardiovascular response to exercise in elderly individuals with coronary artery disease (CAD) who attend ongoing community-based maintenance cardiac rehabilitation (CR) versus age- and gender-matched healthy "very active" (HVA; ≥ 2000 kcal/week) and healthy "less active" (HLA; < 2000 kcal/week) individuals.

Method: Sixty-three participants (age: 72.3 ± 5.1 years; 62% men; n=21 per group) completed the following assessments: (1) symptom-limited graded exercise test with expired gas analysis and bioimpedance assessment of cardiovascular function during exercise; (2) walking tests; (3) physical function; (4) anthropometry and (5) 12-month physical activity recall.

Results: The CR group achieved 98% (range: 73-154%) of age- and gender-predicted peak oxygen consumption for healthy individuals. Peak oxygen consumption was lower in CR compared to HVA but not HLA group (VO_{peak}^p: CR: 19.0 ± 4.5, HVA: 23.7 ± 2.9, HLA: 20.7 ± 4.7 ml·kg^{-1}·min^{-1}, p = 0.001 versus HVA; p = 0.390 versus HLA). Peak heart rate was lower in CR compared to both HVA and HLA. Walking test results and cardiovascular and physical function were not different between the groups.

Conclusions: Elderly individuals with CAD participating in maintenance CR have similar exercise capacity and cardiorespiratory response to exercise compared to their age- and gender-matched less active healthy peers. The findings support referral of elderly patients to community-based CR.

Implications for Rehabilitation: Fitness benefits of long-term maintenance cardiac rehabilitation (CR) programs remain unknown. Elderly individuals with coronary artery disease participating in maintenance CR have exercise capacity and cardiorespiratory response to exercise similar to their less active healthy peers. Maintenance CR may play an important role prolonging independent living in elderly individuals.
Relationship between swallowing function and the skeletal muscle mass of older adults requiring long-term care

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Geriatrics & Gerontology International

ABSTRACT

AIM: The present study investigated the risk factors for dysphagia among older adults who require long-term care, and also examined their systemic decrease in skeletal muscle mass.

METHODS: We evaluated 399 people who required long-term care and who were residing in Omori town, Yokote city, Akita prefecture, Japan. We then analyzed data from 255 participants who had complete information available regarding their sex, age, case history (stroke, Parkinson’s disease and dementia), Barthel Index, Skeletal Muscle Mass Index, oral function test and modified water swallowing test results. Participants’ water swallowing test results were used to create groups with good or poor swallowing function, and a univariate analysis was carried out for each parameter. Parameters with a P-value of <0.25 in the univariate analysis were subsequently included in a multiple logistic regression model as explanatory variables, and good or poor swallowing function were defined as the dependent variables.

RESULTS: After adjusting for age and sex, our analysis showed that poor tongue motility (odds ratio 17.23, 95% confidence interval 5.90-50.31, P <0.001) and decreased Skeletal Muscle Mass Index (odds ratio 3.36, 95% confidence interval 1.41-7.99, P =0.006) were significantly correlated with decreased swallowing function.

CONCLUSIONS: Decreased swallowing function was closely correlated with poor tongue motility, and this finding is similar to those of previous studies. However, the present results also show that decreased Skeletal Muscle Mass Index is a novel risk factor for dysphagia among older adults who require long-term care.

장기 돌봄이 필요한 노인의 연하장애 위험요인과 근격량의 감소와의 연관성을 알아보기 위해, InBody S10을 사용하여 일본 노인 255명의 근격량을 측정하여 SMI(Skeletal muscle mass index)로 평가하였다. 연기능은 MWST*로 평가되었으며, 4/5점을 높은 연기능, 3점 이하를 낮은 연기능을 뜻한다. 연하장애의 위험요인을 분석한 결과, 낮은 협 운동성(OR 17.23, 95% CI 5.90-50.31)과 감소된 SMI(OR 3.36, 95% CI 1.41-7.99)가 낮은 연하 기능과 유의한 연관성이 있었다. 따라서, 협 운동성 뿐만 아니라 감소된 SMI 또한 노인의 연하 장애의 새로운 위험요인이 될 수 있다.

이를 통해, InBody를 이용한 근격량 분석은 노인의 연하장애를 평가하는데 활용될 수 있음을 알 수 있다.

* MWST(modified water swallowing test): 3mL의 찬물을 마셔서 삼키도록 한 후, 삼킴 정도를 평가하여 1점이 가장 낮고 5점이 가장 높은 연기능을 가짐.
Sarcopenia is an independent risk factor of dysphagia in hospitalized older people

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Geriatrics & Gerontology International

ABSTRACT

Aim: Sarcopenia can cause varying physical function disorders, including dysphagia. Malnutrition, a potential result of dysphagia, can also cause sarcopenia. However, the association between sarcopenia and dysphagia is not fully understood, despite evidence suggesting correlations between deglutition disorders and degenerative loss of muscle mass. The present study investigated the prevalence of dysphagia among patients with sarcopenia, and the association between the two conditions.

Methods: We included 224 older adults (mean age 82.5 ± 8.4 years; 37.9% men). Individuals who had a stroke or other diseases that could directly cause dysphagia were excluded. Logistic regression analyses were carried out after adjusting for potential causes of sarcopenia, including malnutrition, a low activity of daily living levels and aging, to investigate the relationship between the skeletal muscle index (SMI), prevalence of sarcopenia diagnosed based on a low SMI and grip strength, and swallowing functions. The Mini-Nutritional Assessment short form was used to assess their nutritional status, and the Barthel Index was used to evaluate their activities of daily living.

Results: The prevalences of sarcopenia and dysphagia were 76.8% and 30.0%, respectively. Multivariate analysis showed that Barthel Index, SMI and presence of sarcopenia were significant independent factors for the prevalence of dysphagia, after adjusting for sex, age and nutritional status. Furthermore, subgroup analysis showed that SMI in males, and both hand-grip strength and SMI in females were lower in dysphagic subjects than in non-dysphagic subjects (P ≤ 0.01).

근갑소증(Sarcopenia)과 연하장애의 연관성을 알아보기 위해서 InBody S10을 사용하여 65세 이상의 일본 노인 224명의 근격관량을 측정하였고, 이것을 기반으로 하여 SMI(Skeletal muscle mass index)를 산출하였다. 연하기능은 FOIS*로 평가하였다.

나이, 영양상태, 일상생활의 신체활동, 근갑소증 중 일상생활의 신체활동(OR 0.982, 95% CI 0.972-0.993)과 근갑소증(OR 5.911, 95% CI 1.648-21.199)이 연하장애와 연관성이 있었다. 낮은 SMI를 가진 노인만을 대상으로 분석한 결과, 남자는 감소된 SMI(r=0.40), 여자는 감소된 SMI(r=0.30)이 연하장애와 연관성을 보였다. 연하장애가 없는 남자와 여자의 SMI는 5.94±0.67, 4.64±0.70kg/m²이었고 연하장애를 가진 남자와 여자의 SMI는 5.15±1.11, 4.17±0.15kg/m²였다.

이제 따라, 근갑소증은 노인에게 있어 연하장애의 위험요인이라고 말할 수 있으며 InBody를 활용한 근갑소증 평가는 노인의 연하장애를 진단하는데 유용하다고 할 수 있다.

* FOIS(functional oral intake scale): 매일의 음식과 음료의 구강섭취량을 평가하여 7점 척도 중 5점 이하일 경우 연하장애로 정의함.
Changes in upper limb extracellular water content during hemodialysis measured by multi-frequency bioimpedance

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The International Journal of Artificial Organs
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ABSTRACT

Introduction: Hemodialysis patients are at risk of chronic volume overload, with consequent increased cardiovascular morbidity and mortality. Multifrequency bioimpedance allows assessment of body fluid volumes. Devices vary from two paired electrodes which measure bioimpedance down one side of the body to four paired electrodes which measure both sides of the body. As arteriovenous fistulae may cause arm swelling, we investigated whether the presence of a fistula affects bioimpedance limb measurements.

Methods: We audited the change in extracellular water (ECW) and total body water (TBW) in the arms following hemodialysis in 414 adult patients attending for routine mid-week hemodialysis session by multifrequency bioimpedance using a four-paired electrode bioimpedance device (InBody720; Biospace, Seoul, South Korea).

Results: Patients with right-sided brachial fistulae had a greater percentage ECW/TBW in the fistula arm both prior to and post dialysis compared to those dialyzing with catheters (pre 39.6 ± 3.5 vs. 38.4 ± 1.6 and post 38.5 ± 1.3 vs. 37.8 ± 1.1, p < 0.01), but there was no difference in the ECW/TBW in the non-fistula arm, pre dialysis between those dialyzing with fistulae compared to catheters, but the ECW/TBW was greater post dialysis with both brachial (38.4 ± 1.1) and radial fistulae (38.1 ± 1.3) compared to those with catheters (37.7 ± 0.9, p < 0.05 respectively).

Conclusions: Although absolute and also relative extracellular fluid volumes are increased in the fistula arm of hemodialysis patients, particularly right-handed and with brachial fistulae, the amount of fluid is unlikely to be of clinical significance when making bioimpedance measurements in the non-fistula side of the body to determine volume status.
Does the presence of an arteriovenous fistula alter changes in body water following hemodialysis as determined by multifrequency bioelectrical impedance assessment

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Hemodialysis International
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ABSTRACT

Multifrequency bioelectrical impedance assessments (MFBIA) aid clinical assessment of hydration status for hemodialysis (HD) patients. Many MFBIA devices are restricted to whole body measurements and as many patients dialyze using arteriovenous fistulas (AVFs), we wished to determine whether AVFs affected body water measurements. We reviewed pre- and post-HD segmental MFBIA measurements in 229 patients attending for midweek HD sessions. Up to 144 were dialyzed with a left arm AVF (L-AVF), 42 with a right arm AVF (R-AVF), and 43 by central venous access catheter (CVC). Water content and lean tissue were greater in the left compared to right arm in those patients with L-AVFs both pre and post dialysis (pre 2.1 ± 0.7 vs. 2.0 ± 0.7 L, and post 1.9 ± 0.6 vs. 1.8 ± 0.6 L and pre 2.65 ± 0.9 vs. 2.56 ± 0.8 kg, and post 2.34 ± 0.8 vs. 2.48 ± 0.8 vs. 2.34 ± 0.8 kg, respectively) and were also greater in the right compared to left arm for those patients dialyzing with R-AVFs (pre-HD 1.92 ± 0.5 vs. 1.86 ± 0.6 L and post-HD 1.79 ± 0.5 vs. 1.7 ± 0.5 L, and pre-HD 2.47 ± 0.6 vs. 2.38 ± 0.7 kg and post-HD 2.3 ± 0.74 vs. 1.28 ± 0.7 kg, respectively). All P < 0.05. There were no significant differences in arm volumes or composition pre or post dialysis in those dialyzing with CVCs. Segmental MFBIA detects differences in arm water and lean mass in patients with AVFs. The presence on an AVF increases the water content in the ipsilateral arm both pre and post HD. This increased water content of the fistula arm will not be detected by whole body bioimpedance devices.
The effect of vascular access modality on changes in fluid content in the arms as determined by multifrequency bioimpedance

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Nephrology Dialysis Transplantation
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ABSTRACT

Introduction: Intradialytic hypotension remains the commonest complication of routine outpatient haemodialysis treatments. Multifrequency bioimpedance allows assessment of body fluid volumes. Multifrequency bioimpedance can potentially monitor changes in extracellular volume during dialysis and may therefore help to reduce intradialytic hypotension. Hypotension-prone patients have been reported to start dialysis with relatively more fluid distributed in the trunk than the arms. However, as arterio-venous fistulae are the preferred form of vascular access and fistulae could potentially affect fluid retention in the arm, we investigated whether multifrequency bioimpedance could detect differences in fluid distribution in the arms with haemodialysis in patients with different vascular access modalities.

Methods: We audited the change in extracellular water (ECW) and total body water (TBW) in the arms following haemodialysis in 100 patients attending for routine outpatient haemodialysis at a university centre by multifrequency bioimpedance using an eight-electrode contact technique.

Results: Patients with fistulae had greater ECW/TBW % in the fistula arm both prior to and post dialysis compared with central venous catheter (CVC) (pre 38.9 ± 0.1 vs 38.3 ± 0.1 and post 38.4 ± 0.1 vs 37.8 ± 0.1, P < 0.01), with a greater absolute difference between arms (0.53 ± 0.01 vs 0.05 ± 0.01, P < 0.01) and greater arm ECW/TBW % compared with total body ECW/TBW % predialysis (forearm fistula 99.4 ± 0.4 vs CVC 97.2 ± 0.3, P < 0.01).

Conclusion: Absolute and also relative extracellular fluid volumes are increased in the fistula arm of haemodialysis patients. Thus, if algorithms are to be developed to monitor relative segmental changes in extracellular volumes to help prevent intradialytic hypotension using bioimpedance, then the dialysis vascular access and site will have to be considered, particularly if using relative changes in the upper limbs. Thus, alternative sites which are not so affected by vascular access, such as the calf, may prove advantageous.
영국인 건강한 외래 혈액 투석환자 100명을 대상으로 CVC(n=40), Form arm AVF(n=40), Upper arm AVF(n=20)와 같은 혈관통로(vascular access)의 형태에 따라 InBody720을 이용하여 세포외수분량, 세포내수분량, 세포외수분비를 측정하였다.

환자 모두에서 투석 전과 비교해 투석 후 세포외수분비가 감소했다. 투석 전 fistula 부위의 세포외수분비가 non-fistula에 비해 높았고, CVC에서는 유의적인 차이는 아니지만 왼팔이 조금 높았다. 투석 전 두 팔의 세포외수분비 차이는 CVC가 가장 작고 Upper arm AVF, Fore arm AVF 순으로 높았다. 투석 후에도 fistula 부위는 CVC에 비해 세포외수분비가 높은 반면, non-fistula 부위는 CVC와 유사하게 나타났다. Total body의 세포외수분비에 대한 팔의 세포외수분비 비율은 모두 100% 이하로 나타났고, fistula 부위가 non-fistula에 비해 높았다. 투석 후 CVC에서는 양팔 모두 유의적으로 비율이 증가하지만 fistula 부위와 비교했을 때 통계적으로 유의하지는 않았다. 팔의 세포외수분비는 혈관통로 형태에 영향을 받고, 특히 Fistula의 존재는 정맥 협착, 폐색 또는 동맥 협착 등으로 수분 저류를 야기시켜 세포외수분량을 증가시킨다.

따라서 AVF를 사용할 때 InBody를 활용하여 팔 이외에 다른 부위의 세포외수분비를 모니터링으로써 투석 중 저혈압 등을 예방할 수 있다고 결론짓고 있다.
Beneficial effects of antidepressant mirtazapine in functional dyspepsia patients with weight loss

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World Journal of Gastroenterology

ABSTRACT

Aim: To explore the effects and mechanism of action of antidepressant mirtazapine in functional dyspepsia (FD) patients with weight loss.

Methods: Sixty depressive FD patients with weight loss were randomly divided into a mirtazapine group (MG), a paroxetine group (PG) or a conventional therapy group (CG) for an 8-wk clinical trial. Adverse effects and treatment response were recorded. The Nepean Dyspepsia Index-symptom (NDSI) checklist and the 17-item Hamilton Rating Scale of Depression (HAMD-17) were used to evaluate dyspepsia and depressive symptoms, respectively. The body composition analyzer was used to measure body weight and fat. Serum hormone levels were measured by ELISA.

Results: (1) After 2 wk of treatment, NDSI scores were significantly lower for the MG than for the PG and CG; (2) After 4 or 8 wk of treatment, HAMD-17 scores were significantly lower for the MG and PG than for the CG; (3) After 8 wk of treatment, patients in the MG experienced a weight gain of 3.58 ± 1.57 kg, which was significantly higher than that observed for patients in the PG and CG. Body fat increased by 2.77 ± 0.14 kg, the body fat ratio rose by 4%, and the visceral fat area increased by 7.56 ± 2.25 cm²; and (4) For the MG, serum hormone levels of ghrelin, neuropeptide Y (NPY), motilin (MTL) and gastrin (GAS) were significantly upregulated; in contrast, those of leptin, 5-hydroxytryptamine (5-HT) and cholecystokinin (CCK) were significantly downregulated.

Conclusion: Mirtazapine not only alleviates symptoms associated with dyspepsia and depression linked to FD in patients with weight loss but also significantly increases body weight (mainly the visceral fat in body fat). The likely mechanism of mirtazapine action is regulation of brain-gut or gastrointestinal hormone levels.
Effects of short term oral corticosteroid intake on dietary intake, body weight and body composition in adults with asthma-a randomised controlled trial

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Clinical & Experimental Allergy

ABSTRACT

Background: Oral corticosteroids (OCS) are an efficacious treatment for asthma exacerbations, yet risk of adverse effects may decrease patient adherence to therapy. In particular, changes in appetite and dietary intake, which lead to weight gain and changes in body composition, are considered undesirable.

Objective: To determine whether 10-day OCS therapy in adults with asthma causes changes in leptin, appetite, dietary intake, body weight and body composition.

Methods: Double-blinded, placebo-controlled randomized cross-over trial of 10 days prednisolone (50 mg) in adults with stable asthma (n = 55) (ACTRN12611000562976). Pre- and post-assessment included spirometry, body weight, body composition measured by dual-energy X-ray absorptiometry and bioelectrical impedance analysis, appetite measured using a validated visual analogue scale (VAS) and dietary intake assessed using 4-day food records. Leptin was measured as a biomarker of appetite and eosinophils as an adherence biomarker. Outcomes were analysed by generalized linear mixed models.

Results: Subject adherence was confirmed by a significant decrease in blood eosinophils (×10⁹/L) following prednisolone compared to placebo [Coef. -0.29, 95% CI: (-0.39, -0.19) P < 0.001]. There was no difference in serum leptin (ng/mL) [Coef. 0.13, 95% CI: (-3.47, 3.72) P = 0.945] or appetite measured by VAS (mm) [Coef. -4.93, 95% CI: (-13.64, 3.79) P = 0.267] following prednisolone vs. placebo. There was no difference in dietary intake (kJ/day) [Coef. 255, 95% CI: (-380, 891) P = 0.431], body weight (kg) [Coef. -0.38, 95% CI: (-0.81, 0.05) P = 0.083] or body fat (%) [Coef. -0.31, 95% CI: (-0.81, 0.20) P = 0.230]. Symptoms including sleep and gastrointestinal disturbance were reported significantly more often during prednisolone vs. placebo.

Conclusions and Clinical Relevance: Short-term OCS in stable asthma did not induce significant changes in appetite, dietary intake, body weight or composition, although other adverse effects may require medical management. This evidence may assist in increasing medication adherence of asthmatics prescribed OCS for exacerbations.
Oral corticosteroid (OCS)는 천식에 효과적인 치료제이지만 부작용의 위험으로 환자 치료제로서 활용이 어려울 수 있다. 본 연구에서는 18세 이상의 호주인 천식환자 55명을 대상으로 10일간의 OCS 치료(하루 Prednisolone을 25mg 씩 2번 복용)가 렘틴, 식욕, 식이섭취, 체중, 체성분에 변화를 주는지 알아보였다. A, B 단계로 나누어 A 단계에서 랜덤하게 플라시보군과 복용군으로 나누고, 10일 후 washout 기간을 거쳐 다시 B단계에서도 A 단계와 동일한 방식으로 시험을 진행하였다. InBody730으로 세포외수분량, 세포내수분량을, DEXA로 체중, 체지방량, 근육량을 측정하였다. 복용군 단계와 플라시보군 단계간에 체중의 유의한 차이가 없었지만, 복용군 단계에서 체중이 플라시보군에 비해 감소하는 경향을 보였다(p=0.067). 체지방량, 근육량은 플라시보군 단계에 비해 복용군 단계에서 변화가 거의 없었다. 세포내수분량은 복용군 단계에서 여성에서만 유의한 감소가 있었다(p=0.036). 렘틴 농도, 식욕, 식이섭취는 두 단계간 유의한 변화가 없었다. 단기간의 OCS 치료는 체성분을 비롯한 식욕, 식이섭취에 유의한 변화가 없었으므로, 천식 환자의 상태 악화에 따른 OCS 처방의 접근을 증가시키는데 도움을 줄 수 있다.
Effects of ziprasidone and olanzapine on body composition and metabolic parameters: an open label comparative pilot study

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Clinical & Experimental Allergy
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ABSTRACT

Background: In contrast to olanzapine, ziprasidone has been reported to cause minimal or no weight gain. This study aimed to compare the effects of ziprasidone and olanzapine on weight, body composition, appetite, resting energy expenditure, substrate oxidation, and metabolic parameters in adults with schizophrenia or other psychotic disorders.

Methods: Twenty adults with schizophrenia or other psychotic disorders were randomized 1:1 to ziprasidone 20–160 mg/day or olanzapine 5–20 mg/day for 12 weeks. The mean doses during the 12-week study period were 109 (range: 65–140) mg/day for ziprasidone and 11.6 (range: 8.2–15.5) mg/day for olanzapine. Body weight, appetite, body composition, resting energy expenditure, and metabolic parameters were measured before and after drug treatment. Outcome measurements before and after medication were compared, and ziprasidone- and olanzapine-treated patients were compared.

Results: After 12 weeks, olanzapine-treated patients showed significant weight gain, particularly fat gain, with increased low density lipoprotein-cholesterol and decreased high density lipoprotein-cholesterol concentrations. In contrast, ziprasidone-treated patients showed no significant weight gain with increased high density lipoprotein-cholesterol concentration.

Conclusions: Ziprasidone was associated with a lower propensity for weight gain and central fat deposition than olanzapine. Studies in larger patient samples are required to confirm these results.
Ipragliflozin effectively reduced visceral fat in Japanese patients with type 2 diabetes under adequate diet therapy

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Endocrine Journal

ABSTRACT

To investigate if ipragliflozin, a novel sodium-glucose co-transporter 2 inhibitor, alters body composition and to identify variables associated with reductions in visceral adipose tissue in Japanese patients with type 2 diabetes mellitus. This prospective observational study enrolled Japanese participants with type 2 diabetes mellitus. Subjects were administered ipragliflozin (50 mg/day) once daily for 16 weeks. Body composition, visceral adipose tissue volume and plasma variables were measured at 0, 8, and 16-weeks. The subjects' lifestyle habits including diet and exercise were evaluated at baseline and 16 weeks. The primary endpoint was defined as the decrease of visceral adipose tissue mass. Twenty-four of 26 enrolled participants completed the study. The visceral adipose tissue decreased significantly (110 ± 33 to 101 ± 36 cm², p = 0.005) as well as other parameters for metabolic insufficiency including hemoglobin A1c. Seventy-one % of the total body weight reduction (-2.49 kg) was estimated by a decrease in fat mass (-1.77 kg), and the remaining reduction (22%) by water volume (-0.55 kg). A minor but significant reduction in the skeletal muscle index was also observed. Correlation analyses were performed to identify variables associated with changes in visceral adipose tissue and the only significant variable identified was diet therapy (Spearman’s r = -0.416, p = 0.043). Ipragliflozin significantly decreased visceral adipose tissue, and improved parameters for metabolic dysfunction. Adequate diet therapy would be necessary to induce and enhance the therapeutical merit.

SGLT2(Sodium-glucose transporter 2)인 Ipragliflozin이 당뇨 환자의 체성분을 변화시키고 내장지방을 감소시키는지 20-75세의 일본인 제2형 당뇨 환자 24명을 대상으로 알아보았다. 환자들은 Ipragliflozin(50mg/d)을 16주간 복용하였고, 0주, 8주, 16주에서 InBody720으로 총 체수분량, 근육량, 제지방량을 측정, 타 BIA 장비로 VAT(visceral adipose tissue)를 측정하였다.

8주 후, 전체 BFM은 유의하게 감소(p<0.001), 16주에는 약간 감소하였다(0주: 27.9±11.9kg, 8주: 26.9±11.8, 16주: 26.2±11.6). 총 체수분량, 제지방량, SMI(Skeletal muscle mass index)도 8주차에 유의하게 감소하였으나(총 체수분량: 35.1±7.3 to 34.6±7.2kg, 제지방량: 44.9±9.4 to 44.3±9.3, SMI: 7.5±1.1 to 7.3±1.2kg/m², all p<0.001), 16주차에는 거의 변화가 없었다. 16주 후 유의한 체중감소(-2.49kg)는 제지방량 감소(-1.77±1.84kg), 총 체수분량 감소(-0.55±0.80kg), 단백질, 무기질의 감소(-0.14±0.21kg, -0.03±0.08kg)에 의한 것으로 나타났다. VAT는 8, 16주에서 모두 유의하게 감소하였다(0주: 110±33cm², 8주: 102±36cm², 16주: 101±34cm², 각 p=0.005).

Ipragliflozin의 복용으로 당뇨환자의 VAT와 측정이 감소하였는데, 이 체중감소 중 제지방량의 감소가 총 체수분량, 제지방량, 단백질, 무기질 감소분보다 크다는 것을 InBody를 통해 알 수 있었다.
Safety and efficacy of long-term tolvaptan therapy for decompensated liver cirrhosis

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ABSTRACT

Aim: Recently, the short-term efficacy of the vasopressin V2 receptor antagonist tolvaptan for the treatment of ascites in cirrhosis was reported. However, the long-term effects remain unknown. Here, we report the clinical features of decompensated cirrhosis treated using long-term tolvaptan therapy, and evaluate its safety and efficacy.

Methods: Fifty-five cirrhotic patients hospitalized due to ascites, despite receiving appropriate diuretic treatment, were treated with tolvaptan. We excluded 35 patients due to liver transplant (20.0%), death (28.6%), poor general status (14.3%), improved ascites (5.7%) or other reasons (31.4%). In 20 cases treated with tolvaptan for 6 months, total body water (TBW) and extracellular fluids (ECW) were measured using bioelectric impedance analysis (BIA) with an InBody720.

Results: The median age of the 20 patients was 64 years (range, 48–90), and 60% were male. The etiology of cirrhosis included hepatitis C (45%), alcohol-induced (20%) and other (35%). The percentage of patients with Child–Pugh class A, B and C was 0%, 40% and 60%, respectively. Biochemical findings revealed that serum creatinine levels and estimated glomerular filtration rate were not affected during 6 months of treatment with tolvaptan, and there was no renal disturbance. The median serum sodium levels were increased from 138 to 139 mEq/L, but serious adverse events related to renal and liver function were not observed. Data also revealed that long-term treatment reduced the BIA-estimated ECW/TBW ratio.

Conclusion: Long-term tolvaptan treatment was a safe and effective treatment for decompensated cirrhosis.

간경변의 복수 치료에 이용되는 vasopressin V2 receptor antagonist인 Tolvaptan의 단기 효과에 대해 보고된 바 있지만, 장기 향성을 대해서는 연구된 바 없다. 본 연구에서는 Tolvaptan 장기 치료에 의한 임상 특징과 안전성 및 효능에 대해 48-90세의 일본인 비대상성 간경변 환자 20명을 대상으로 알아보았다. 대상자들은 Tolvaptan의 복용은 전체 복용량의 1/2로 시작하여(3.75mg/d), 체중감소가 1kg미만이면 7.5mg/d로 증량하여, 총 6개월간 복용하였다. 20명 중 Child-Pugh class A, B, C는 각각 0%, 40%, 60%였고, 혈청중에 요양류가 60%, 간암이 35%, 간성분해가 20%에 속하였다. 20명 중 8명은 InBody720을 활용하여 총 체수분량, 세포외수분량, 단백질을 측정하였다. 몇몇의 경우 1-3개월 후 체중의 점차적 증가가 있었지만, 6개월 후, 환자의 78.6%가 치료 전에 비해 체중이 감소하였고, 세포외수분비는 유의한 감소가 있었다(p<0.05). 단백질량/체중은 Tolvaptan 치료 이후 영향을 받지 않았다. 이에, 혈청 크레아티닌 수치와 추정 사구체예과율은 6개월의 Tolvaptan 치료 동안 영향을 받지 않았고, 신장에 장애를 주지 않았다. 장기간의 Tolvaptan 치료는 비대상성 간경변 환자에 안전하고 효과적임이 밝혀졌다.
Body composition and muscle strength predictors of jumping performance: differences between elite female volleyball competitors and non-trained individuals

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ABSTRACT

Studies of the role of various anthropometric, physiological, and biomechanical variables in performance of rapid movements have generally revealed inconsistent findings. Within this study, we tested the hypotheses that (a) both body composition and leg extensor strength variables would reveal significant relationship with jumping performance, whereas (b) the same relationships would be stronger in physically active nonathletes than in the elite athletes proficient in vertical jumping. Top level female volleyball players (VP; N = 35) and physically active female nonathletes (PA; N = 21) were tested on maximum vertical jumps performed with and without arm swing, as well as on body composition (percent fat and muscle) and leg press strength (maximum force and the rate of force development). The results revealed significant relationships between the jumping performance and body composition variables that appeared to be higher in PA (r = 0.65–0.76; all p < 0.01) than in VP (r = 0.37–0.42; all p ≤ 0.05). The relationships between the jumping performance and the leg strength variables were mainly significant (r = 0.23–0.68) and similar in 2 groups. We conclude that not only the leg extensor strength but also the body composition variables could be valid predictors of jumping performance and, possibly, other rapid movements. Moreover, the body composition variables that have been mainly neglected in the literature could be particularly strong predictors of performance of jumping in nonathletes, as compared with relatively homogeneous populations of elite athletes.

16-29세의 세르비아 여성 배구선수(VP) 35명의 체성분 및 근력이 수직점프 실력에 영향을 미치는지 알아보기위해 신체활동이 많은 여성(PA) 21명과 비교 평가하였다. InBody720을 활용하여 체성분을 측정, 점프실력과 레그프레스 강도 시험도 함께 시행하였다. VP는 PA보다 높은 골격근률, 낮은 체지방률을 가지고 있었고, 훌씬 높은 CMJn*과 CMJa*을 기록했다. 골격근률과 체지방률은 VP보다 PA의 점프실력을 더 잘 예측하는 요인이었다. 전문 훈련을 받지 않은 일반인 여성에서는 체지방률과 골격근률로 점프 실력을 꼭 근접하게 예측을 할 수 있어, 점프나 폭발적인 운동을 위한 다양한 교육이나 테스트 프로그램을 설계할 때는 곧 이 두 변수가 고려되어야 한다. 점프 실력은 다리근력과 체성분에 좌우되므로 InBody로 체지방과 근육량을 모니터링 하는 것이 운동능력을 향상시키는 유용한 도구가 될 것이다.
Body Composition Features in Different Playing Position of Professional Team Indoor Players: Basketball, Handball and Futsal

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ABSTRACT

The aim of the present research was to analyze the body composition (BC) and the differences in BC among different playing position in professional basketball, handball and futsal players. BC was assessed in 70 professional indoor team sport players. Players were divided in 4 groups depending on the playing position: group 1, point guard, center/wings and defense; group 2, shooting guard/small forward, handed and midfielder; group 3, power forward/center, pivot and forward; and group 4 goalkeeper. Significant differences between playing positions in basketball in body mass (BM), height, proteins, minerals and arms, legs and trunk BM were found. In handball, significant differences between center/wings and pivot in BM and muscle mass, and between goalkeepers and handed in percentage of fat were measured. Significant differences were also found in BM of each playing position groups in the three sports and in arms and legs BM in groups 1 and 2, and trunk BM and height in group 2. Group 3 presented significant differences between futsal and basketball in skeletal muscle mass and trunk BM, and between basketball and handball in left leg BM and total BM. In group 4 significant differences in BM, height and trunk and leg BM between futsal and handball were found. BC in indoor team sports depend on the playing position and the sport discipline, the BC being result of the specific game actions of each playing position.
Changes in foot volume, body composition, and hydration status in male and female 24-hour ultra-mountain bikers

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ABSTRACT

Background: The effects of running and cycling on changes in hydration status and body composition during a 24-hour race have been described previously, but data for 24-hour ultra-mountain bikers are missing. The present study investigated changes in foot volume, body composition, and hydration status in male and female 24-hour ultra-mountain bikers.

Methods: We compared in 49 (37 men and 12 women) 24-hour ultra-mountain bikers (ultra-MTBers) changes (Δ) in body mass (BM). Fat mass (FM), percent body fat (%BF) and skeletal muscle mass (SM) were estimated using anthropometric methods. Changes in total body water (TBW), extracellular fluid (ECF) and intracellular fluid (ICF) were determined using bioelectrical impedance and changes in foot volume using plethysmography. Haematocrit, plasma [Na⁺], plasma urea, plasma osmolality, urine urea, urine specific gravity and urine osmolality were measured in a subgroup of 25 ultra-MTBers (16 men and 9 women).

Results: In male 24-hour ultra-MTBers, BM (P < 0.001), FM (P < 0.001), %BF (P < 0.001) and ECF (P < 0.05) decreased whereas SM and TBW did not change (P > 0.05). A significant correlation was found between post-race BM and post-race FM (r = 0.63, P < 0.001). In female ultra-MTBers, BM (P < 0.05), %BF (P < 0.05) and FM (P < 0.001) decreased, whereas SM, ECF and TBW remained stable (P > 0.05). Absolute ranking in the race was related to Δ%BM (P < 0.001) and Δ%FM in men (P < 0.001) and to Δ%BM (P < 0.05) in women. In male ultra-MTBers, increased post-race plasma urea (P < 0.001) was negatively related to absolute ranking in the race, Δ%BM, post-race FM and Δ%ECF (P < 0.05). Foot volume remained stable in both sexes (P > 0.05).

Conclusions: Male and female 24-hour ultra-MTBers experienced a significant loss in BM and FM, whereas SM remained stable. Body weight changes and increases in plasma urea do not reflect a change in body hydration status. No oedema of the lower limbs occurred.

체코의 산악자전거 레이싱 선수 49명의 24시간 레이싱 후, foot volume과 InBody720을 활용하여 체성분, 수분상태 변화를 조사하였다.
남녀 모두의 경기 랭킹은 체중 및 체지방량 변화와 비례관계, 수분섭취와 반비례 관계를 보였다. 남성의 체지방량과 체지방률이 감소한 반면, 골격근량은 유의하게 감소하지는 않았고, 세포외액은 감소하였으나 총체수분과 세포내액은 유의하게 감소하지 않았다. 세포외액 변화는 체중 변화와 비례, 혈장 urea와는 반비례관계였으며, 혈장부피 변화나 수분섭취와는 관련이 없었다. 여성 역시 체지방량과 체지방률이 감소했지만 골격근량은 유의하게 감소하지 않았다. 수분섭취는 체중, 체지방량 변화나 혈장 urea 변화와 관련이 없었고, 하지 volume에 유의한 변화가 없었다. 남녀 모두 레이싱 후 체중과 체지방량이 감소했으나 골격근량이 안정적으로 유지되었고, 하지부종은 발생하지 않았다. InBody를 통한 산악자전거 선수들의 체성분 분석은 이들의 경기력을 향상시키는데 유용한 참고가 될 수 있음을 시사 한다.
Somatotype and body composition analysis of Korean youth soccer players according to playing position for sports physiotherapy research

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ABSTRACT

Purpose : The purpose of this study was to investigate the somatotype and physical characteristic differences among elite youth soccer players.

Subjects and Methods : In the present study, we evaluated twenty-two Korean youth soccer players in different playing positions. The playing positions were divided into forward (FW), midfielder (MF), defender (DF), and goalkeeper (GK). The participants' lean body mass (LBM), fat free mass (FFM), fat mass (FM), and basal metabolic rate (BMR) were measured and their somatotype determined according to the Heath-Carter method.

Results : The youth soccer players had twelve ectomorphic, eight mesomorphic, and two central predominant types. The DFs were taller than, but otherwise similar in physical characteristics to the FWs and MFs. The GKs were taller and heavier than the other players; however, their somatotype components were not significantly different. LBM, FFM, and BMR were significantly higher in GKs than in FWs and MFs. Although LBM, FFM, and BMR values between GKs and DFs showed large differences, they were not statistically significant.

Conclusion : The present study may contribute to our understanding of the differences in somatotype and body composition of Korean youth soccer players involved in sports physiotherapy research.

10대 한국인 축구 선수 22명의 포지션(포워드, 피드필더, 수비, 골키퍼)에 따른 체형과 신체 특징의 차이를 조사하였다. 선수들의 체형은 체지방률이 5% 전후로 체지방이 적고 약간 마른 외배엽형과 과반수 이상에 속했다. InBody520으로 체성분을 측정한 결과 각 포지션 선수들간에 유의한 차이는 없었지만 공격수, 미드필더들보다 골키퍼들의 과격근량, 제지방량, 기초대사량이 유의하게 높았다. 골키퍼를 제외하고는 신체적 특성에 차이가 없어 성인 선수들에 비해 더 쉽게 포지션을 바꿀 수 있음을 의미한다. 일반적인 성인 축구선수들의 체형은 중배엽형은 근골격이 잘 발달되어 있어 외배엽형에 비해 부상률이 적으므로 체지방감소와 과격근량 증가가 청소년 축구선수들의 안전에 유리하다. 청소년 선수들의 부상을 예방하고 부상으로부터의 회복을 돕기위해 InBody를 통한 체지방과 과격근량 모니터링이 요구될 것으로 보인다.
Altered levels of serum sphingomyelin and ceramide containing distinct acyl chains in young obese adults

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ABSTRACT

Objective: Recent studies indicate that sphingolipids, sphingomyelin (SM) and ceramide (Cer) are associated with the development of metabolic syndrome. However, detailed profiles of serum sphingolipids in the pathogenesis of this syndrome are lacking. Here we have investigated the relationship between the molecular species of sphingolipids in serum and the clinical features of metabolic syndrome, such as obesity, insulin resistance, fatty liver disease and atherogenic dyslipidemia.

Subjects: We collected serum from obese (body mass index, BMI 5 35, n = 12) and control (BMI = 20 – 22, n = 11) volunteers (18 – 27 years old), measured the levels of molecular species of SM and Cer in the serum by liquid chromatography-mass spectrometry and analyzed the parameters for insulin resistance, liver function and lipid metabolism by biochemical blood test.

Results: The SM C18:0 and C24:0 levels were higher, and the C20:0 and C22:0 levels tended to be higher in the obese group than in the control group. SM C18:0, C20:0, C22:0 and C24:0 significantly correlated with the parameters for obesity, insulin resistance, liver function and lipid metabolism, respectively. In addition, some Cer species tended to correlate with these parameters. However, SM species containing unsaturated acyl chains and most of the Cer species were not associated with these parameters.

Conclusions: The present results demonstrate that the high levels of serum SM species with distinct saturated acyl chains (C18:0, C20:0, C22:0 and C24:0) closely correlate with the parameters of obesity, insulin resistance, liver function and lipid metabolism, suggesting that these SM species are associated with the development of metabolic syndrome and serve as novel biomarkers of metabolic syndrome and its associated diseases.
Association between objectively measured sleep quality and obesity in community-dwelling adults aged 80 years or older: A cross-sectional study

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ABSTRACT

The purpose of this study was to examine the association between objective measures of sleep quality and obesity in older community-dwelling people. This cross-sectional study included 189 community-dwelling adults aged ≥ 80 yr (83.4 ± 2.5 yr [age range, 80-95 yr]). Participants wore an accelerometer (ActiGraph GT3X+) on their non-dominant wrist 24 hr per day for 7 consecutive nights. Sleep parameters measured included total sleep time, sleep efficiency, and wake after sleep onset (WASO) during the night. Associations between sleep parameters and obesity were investigated by using multivariate logistic regression analysis. In multivariate models, those with sleep efficiency lower than 85% had a 2.85-fold increased odds of obesity, compared with those with sleep efficiency of 85% or higher. Similarly, those with WASO of ≥ 60 min (compared with < 60 min) had a 3.13-fold increased odds of obesity. However, there were no significant associations between total sleep time or self-reported napping duration and obesity. We found that poor sleep quality was an independent risk factor for obesity in community-dwelling Japanese adults aged ≥ 80 yr, even after controlling for potential confounding factors, including daily physical activity.

노인의 객관적으로 측정된 수면의 질과 비만의 연관성을 알아보기 위해, InBody720으로 일본 수도권 지역의 80세 이상노인 189명의 체지방률, 사지 제지방량을 측정하였다. 휴식에 가속도계를 연속 7일간 24시간 동안 착용하였고, 총 수면 시간, 수면 효율성(침대에 있는 시간 중 잠든 시간의 비율), 수면 중 깨어있는 시간이 수면 지표로 측정되었다. 가속도계는 수면과 신체활동을 측정하며 수면과 깨어있는 패턴을 밤 동안 기록하고 측정할 수 있다. 수면 효율성이 85% 미만인 사람은 85% 이상인 사람들보다 비만의 위험이 2.85배 높았고, 수면 중 깨어있는 시간이 60분 이상인 사람은 60분 미만인 사람들에 비해 비만의 위험이 3.13배 높았다. 수면 중 깨어있는 시간과 수면 효율성은 체지방률, 사지 제지방량/BMI과 유의한 연관성이 있었다(r=0.198, p=0.007, and r=0.184, p=0.012; r=-0.150, p=0.041, and r=0.164, p=0.025, respectively). 총 수면시간과 체성분 사이에는 연관성이 없었다. 이는 좋지 않은 수면의 질은 80세 이상의 일본 노인들에게 비만의 위험요인이 될 수 있음을 시사한다. 따라서, InBody를 통한 체성분 측정과 수면의 질과의 연관성을 노인들의 비만을 예방하는데 활용될 수 있다.
Correlation between Body Composition and Walking Capacity in Severe Obesity

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ABSTRACT

Background: Obesity is associated with mobility reduction due to mechanical factors and excessive body fat. The six-minute walk test (6MWT) has been used to assess functional capacity in severe obesity.

Objective: To determine the association of BMI, total and segmental body composition with distance walked (6MWD) during the six-minute walk test (6MWT) according to gender and obesity grade.

Setting: University of São Paulo Medical School, Brazil; Public Practice.

Methods: Functional capacity was assessed by 6MWD and body composition (%) by bioelectrical impedance analysis in 90 patients.

Results: The mean 6MWD was 514.9 ± 50.3 m for both genders. The male group (M: 545.2 ± 46.9 m) showed a 6MWD higher (p = 0.002) than the female group (F: 505.6 ± 47.9 m). The morbid obese group (MO: 524.7 ± 44.0 m) also showed a 6MWD higher (p = 0.014) than the super obese group (SO: 494.2 ± 57.0 m). There was a positive relationship between 6MWD and fat free mass (FFM), FFM of upper limbs (FFM_UL), trunk (FFM_TR) and lower limbs (FFM_LL). Female group presented a positive relationship between 6MWD and FFM, FFM_UL and FFM_LL and male group presented a positive relationship between 6MWD and FFM_TR. In morbid obese group there was a positive relationship between 6MWD with FFM, FFM_UL, FFM_TR and FFM_LL. The super obese group presented a positive relationship between 6MWD with FFM, FFM_TR and FFM_LL.

Conclusions: Total and segmental FFM is associated with a better walking capacity than BMI.

성별과 비만도에 따른 BMI, 전체와 부위별 체성분과 6분 테스트(6MWT) 동안 걸은 거리와의 연관성을 알아보기 위해, InBody 230로 브라질 18-60세의 40≤BMI≤60인 성인 90명을 대상으로 체지방량과 체지방량을 측정하였다. 6MWT는 심각한 비만의 기능적 특성을 평가하기 위해 사용된 평가 방법으로, 36m의 평평한 복도에서 6분간 가능한 가장 멀리 걸어간 거리(6MWD)를 측정한다. 전체의 6MWD는 514.9±50.3m였고, 남자가 여자보다 6MWD가 더 높았다. 병적비만(morbid obesity, MO) 그룹이 고도 비만(super obesity, SO) 그룹보다 6MWD가 더 높았다. 여자의 6MWD와 총 체지방량, 팔의 체지방량, 다리의 체지방량이 유의한 비례관계를 보였고, 남자는 몸통의 체지방량과 비례관계를 보였다. MO그룹은 6WMD와 총 체지방량, 팔의 체지방량, 몸통의 체지방량, 다리의 체지방량과 비례관계를 보였고, SO그룹은 총 체지방량, 몸통의 체지방량과 다리의 체지방량과 비례관계를 보였다. BMI는 여자에게서만 6MWD와 유의한 반비례관계를 보였다. 이와 같은 결과는 전체 그리고 부위별 체지방량이 BMI보다 건기 능력과 연관성이 더 깊음을 시사한다. 결론적으로, 심각한 비만 환자들의 체성분을 분석하는데 있어 InBody가 활용될 수 있다.
Cortisol reactivity, delay discounting and percent body fat in Chinese urban young adolescents

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Appetite
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ABSTRACT

The purpose of this study is to test the relation of cortisol reactivity, delay discounting and percent body fat (PBF) in adolescents aged 12-13 years (N=87), and evaluate the delay discounting as potential components in models of adolescent obesity. Anthropometry and body composition measurements were assessed in adolescents. The cortisol reactivity to Trier Social Stress Test for Children (TSST-C) and delay discounting were measured. The result showed increased cortisol reactivity and greater delay discounting were associated with higher PBF in girls. Structural equation modeling supported greater delay discounting as a mediator of relations between increased cortisol reactivity and PBF in adolescent girls. The proposed mediation model indicated that cortisol reactivity is linked to PBF through delay discounting, thereby supporting a significant indirect relationship. The direct relationship between increased cortisol reactivity and higher PBF was significant in a model that did not include delay discounting, and was still significant in the mediation model that included delay discounting. This study provides the first evidence that greater delay discounting may partially account for the relationship of hyperactivity of the HPA-axis and higher PBF in girls.

*delay discounting*: 충동제어. 나중에 더 큰 보상을 얻기보다 지금 당장 작은 보상을 얻으려는 욕구의 정도를 알아보는 지표로 사용한다.
Counterintuitive relationship between visceral fat and all-cause mortality in an elderly Asian population

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Obesity
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ABSTRACT

Objective: Abdominal obesity is considered to be a risk factor for mortality. However, recent studies indicate that overweight may be negatively associated with mortality (“obesity paradox”). The relationships between mortality and various obesity markers in an elderly Asian cohort were evaluated.

Methods: Subjects of the Korean Longitudinal Study on Health and Aging (KLoSHA) (n = 1000, age ≥65 years) were included. The visceral fat area (VFA) and subcutaneous fat area (SFA) were measured using computed tomography.

Results: A total of 222 deaths occurred during the 6-year follow-up (median = 5.2 [range 0.1-6.3] years). Body mass index (BMI), VFA, SFA, and total fat mass were negatively associated with all-cause mortality in the univariable analyses (hazard ratio [HR] 0.67 per 1 SD [95% CI 0.57-0.77], 0.66 [0.55-0.79], 0.73 [0.61-0.86], and 0.74 [0.63-0.87], respectively). BMI and VFA were significantly associated with all-cause mortality in the multivariable analyses (HR 0.85 per 1 SD [95% CI 0.73-0.99] and 0.64 [0.47-0.87], respectively). When stratified by quartiles, the HR associated with VFA was the lowest in the third quartile.

Conclusions: In this observational study with a short follow-up of elderly Asian people, higher amounts of visceral fat, a marker for central obesity, were associated with decreased all-cause mortality.
Effect of aerobic training and resistance training on circulating irisin level and their association with change of body composition in overweight, obese adults_a pilot study

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Physiological Research

ABSTRACT

The novel myokine irisin has been reported as a therapeutic target for metabolic disease. The objective of this study is to reveal the effects of aerobic training (AT) and resistance training (RT) on circulating irisin levels and their associations with change of body composition in overweight/obese adults. Twenty eight overweight/obese adults (BMI>23 kg/m(2)) were included in this study and compared before and after 8 weeks of exercise program (60 min/day, 5 times in a week). The subjects, in both aerobic and resistance training, showed significant improvement in anthropometric parameters and exercise capacities including maximal oxygen uptake and muscle strength. Interestingly, the circulating irisin was significantly increased in resistance training group (p=0.002) but not in aerobic training (p=0.426) compared to control group. In addition, we found the positive correlation between change of the circulating irisin and muscle mass (r=0.432, p=0.022) and the negative correlation between change of the circulating irisin and fat mass (r=-0.407, p=0.031). In the present pilot study, we found that circulating irisin level was increased by 8 weeks of resistance training in overweight/obese adults, suggesting that resistance training could be the efficient exercise type in overweight/obese considering positive change of body composition concomitant with increase of irisin levels.

순환 irisin* 수치와 이것의 과체중 혹은 비만 성인에 있어서 체성분 변화와의 연관성에 대한 무산소 운동 및 저항성 운동의 효과를 조사하였다. InBody370으로 19-35세이면서 BMI>23, 의 한국의 과체중, 비만 성인 28명을 대상으로 체지방량, 체지방률, 골격근량을 측정하였고, 8주간의 운동 후, 결과를 비교하였다.

8주 후, 대조군을 제외한 무산소 운동군, 저항성 운동군에서 모두 체지방량이 유의하게 감소하고, 골격근량이 유의하게 증가하였고, ANOVA 결과, 세 군간에 유의한 차이를 보였다(p<0.001). 순환 irisin은 저항성 운동군에서 유의하게 증가하였지만(p=0.002), 무산소 운동군에서는 유의하지 않았다. 순환 irisin과 근육량 변화간에는 비례관계(p=0.022), 체지방량 변화와는 반비례 관계를 보였다(p=0.031). 운동 트레이닝에 따른 순환 irisin의 변화는 과체중, 비만인들의 체성분의 긍정적인 개선과 밀접한 관련이 있는 것으로 나타났다.

비만 치료에 참고 역할을 하는 irisin 수치는 운동 시행에 따라 증가되고, 동시에 체성분의 긍정적인 변화도 나타나 InBody를 통한 체성분 측정이 비만 치료에 유용하게 활용될 수 있음을 보여준다.

* irisin: 새로운 myokine(근육에서 분비, 염증물질을 억제)라고 불리며, 비만과 2형 당뇨를 치료하는데 중요한 역할을 함
Optimal cutoffs of percentage body fat for predicting obesity-related cardiovascular disease risk factors in Korean adults

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The American Journal of Clinical Nutrition
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ABSTRACT

Background: Obesity is a major health problem. It is associated with cardiovascular disease. The diagnosis of obesity is crucial to treating and preventing obesity-related medical problems.

Objective: The objective was to determine optimal percentage body fat cutoffs in Korean adults for predicting obesity-related cardiovascular disease risk factors.

Design: We evaluated the body composition and prevalence of obesity-related cardiovascular risk factors, such as hypertension, diabetes mellitus, and dyslipidemia, in 41,088 Korean adults aged 18-92y. The optimal percentage body fat cutoffs for Korean adults were determined. Multivariable-adjusted odds ratios (ORs) of overweight and obesity were estimated by logistic regression.

Results: The first cutoffs in men and women were 17% and 32% body fat, respectively; the second cutoffs were 21% and 37% body fat, respectively. The percentages of obese men and women were 41.8% and 15.9%, respectively. The adjusted OR of at least one risk factor for overweight or obesity in men was 2.22 (95% CI: 2.07, 2.38) or 4.05 (95% CI: 3.78, 4.33). The adjusted OR for women was 1.95 (95% CI: 1.79, 2.07; P < 0.0001) or 3.21 (95% CI: 2.87, 3.57).

Conclusions: Only one-fourth of Korean men had a normal body composition, whereas most of the Korean women had a normal body composition. We conclude that susceptibility to cardiovascular disease and its risk factors is higher in Korean men than in Korean women. The cutoffs are useful for providing adequate guidelines for treating and preventing cardiovascular disease. This was the first study to determine cutoffs of percentage body fat for Korean adults.
한국 성인의 비만과 관련된 심혈관계 질환의 위험요인을 예측하는데 있어 최적의 체지방률 cutoff를 설정하기 위해, 18-92세의 한국 성인 41,088명을 대상으로 InBody3.0을 사용하여 체지방량, 체지방량, 체지방률을 측정하였다. 대상 자들을 심혈관계질환 위험과 체지방률을 기반으로 minimum P value approach로 분석하여, 위험그룹으로부터 정상그룹을 최적으로 구분하였다. 남성과 여성 각각 17-21%, 32-37%에 해당될 때 과체중, 21%, 37% 이상일때 비만이라고 정의하였다.

여성의 과체중, 비만의 비율은 각각 74.1%, 41.8%와 46.2%, 15.9%였다. 이 기준에 근거하여, 남성과 여성을 각각 Normal, Overweight, Obese로 나누어 지방세포와 관련된 심혈관계 질환의 위험을 분석하였다. 남자의 Overweight과 Obese 그룹은 Normal 그룹보다 심혈관계 질환의 위험요인을 1개 이상 가질 확률이 각각 2.22배, 4.05배 높았고, 여자의 Overweight과 Obese 그룹은 각각 1.95배, 3.21배 높았다. 한국 남성의 ¼만이 정상적인 체성분을 가지고 있었고, 여자는 대부분이 정상적인 체성분을 가지고 있었다.

결론적으로, 심혈관계 질환에 대한 민감성은 한국 남성이 여성보다 더 높다고 말할 수 있다. 따라서, InBody를 통한 체성분 측정은 여러 인구 집단의 비만 기준을 설정하고 만성질환의 위험도를 예측하는데 유용하게 활용될 수 있다.
Serum sterol profiling reveals increased cholesterol biosynthesis in childhood obesity

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Journal of Steroid Biochemistry and Molecular Biology

ABSTRACT

Quantitative sterol profiling in obese children and their clinical implications have not been fully investigated. The aim of study was to evaluate the metabolic changes in serum cholesterol and its precursors and metabolites, and their associations with clinical characteristics of childhood obesity. A total of 253 children aged 6-14 years (72 obese, 39 overweight, and 72 normal controls; 147 girls and 106 boys) were recruited. Anthropometric indices, body composition, and fasting total lipid profiles were determined. Serum concentrations of 20 sterols, as their free fraction, were analyzed through gas chromatography-mass spectrometry-based metabolite profiling. There were no significant differences in total- and LDL-cholesterols between groups. Serum levels of the main cholesterol precursors, lanosterol (P<0.02) and lathosterol (P<0.0001), were significantly higher in obese children. In addition, they showed positive correlations with waist to hip ratio, body fat percent, and body fat mass. The metabolic ratios of lanosterol and lathosterol to cholesterol were also elevated (P<0.01 both), indicating the up-regulation of cholesterol biosynthesis with childhood obesity. In contrast, the absorption of plant sterols tended to show a compensatory decrease in obese children. Strong correlations between free cholesterol and total- and LDL-cholesterols were observed (r>0.760, P<0.001), while there was no correlation with HDL-cholesterols. The levels of total cholesteryl ester were closely associated with triglyceride (r=0.763, P<0.001). Quantitative results indicate that childhood obesity may increase cholesterol synthesis while maintaining overall cholesterol homeostasis.

혈청 콜레스테롤과 이의 전구체와 대사물질의 대사적 변화를 평가하고, 소아 비만의 임상적 특징과의 관련성을 알아 보았다. InBody720을 활용하여 한국의 6-14세 정상 어린이 142명, 과체중 어린이 39명, 비만 어린이 72명, 총 어린이 253명을 대상으로 그룹별 복부지방률, 체지방량, 체지방률을 측정하였다. 그 결과, 과체중, 비만 그룹일수록 복부지방률, 체지방량, 체지방률의 값이 점차 증가하였다. 콜레스테롤의 전구체인 lathosterol값과 lathosterol이 유리 콜레스테롤이 되는 대사 비율도 비만 그룹에서 높은 모습을 보였다. Lathosterol 농 도와 콜레스테롤의 대사율은 인체 전체의 콜레스테롤 합성의 자료가 될 수 있으므로, lathosterol의 혈중 농도 증가와 그 대사율은 소아 비만에 있어서 콜레스테롤 과정 합성을 판단하는 정보를 주며, 심혈관대사의 위험요인 될 수 있다. 그러므로 InBody를 통해 살펴본 과체중 및 비만 어린이의 복부지방률, 체지방량, 체지방률의 추이는 유의미한 가치가 판단하는데 사용될 수 있다.
Association between home blood pressure and body composition by bioimpedance monitoring in patients undergoing peritoneal dialysis

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ABSTRACT

Home blood pressure (HBP) is an independent predictor of cardiovascular and renal function. However, no particular guidelines have been established for optimal HBP in peritoneal dialysis (PD) patients. Bioelectrical impedance analysis (BIA) is a beneficial tool for determining body composition. In the present study, we used BIA to determine body composition parameters that might play a role in the regulation of HBP in PD patients, and we compared HBP with office blood pressure (BP). Our study enrolled 15 patients (11 men, 4 women) receiving PD at Tohoku University Hospital, who, for 1 year, agreed to monitor HBP and to undergo body composition analysis. Patients were requested to measure HBP twice daily (morning, night) using a home BP device. A bioimpedance monitor was used to monitor body composition each month. Blood and urine samples were also analyzed each month. The relationships of average morning systolic HBP (sMHBP) with parameters of body composition and of blood and urine analyses were evaluated. The enrolled patients were 66.3 ± 7.7 years of age and had a PD vintage of 28.3 ± 6.4 months. Overall, their sMHBP was 128 ± 13 mmHg and their office systolic BP was 126 ± 15 mmHg. Although office systolic BP and sMHBP both correlated with body fluid parameters [total body water (TBW)/height²], renal function (renal Kt/V serum creatinine), and heart function (left ventricular mass index), the correlation coefficient for sMHBP and TBW/height² was highest, with sMHBP being the only independent predictor. Sodium intake was associated only with sMHBP. Our results suggest that body fluid status determined by BIA, heart and renal function, and sodium intake show better associations with sMHBP than with office systolic BP. Monitoring HBP and body composition by BIA are beneficial for the maintenance of volume status in PD patients.

MHBP (morning home blood pressure)가 체액상태와 연관이 있고, 복막투석 환자의 최적 혈압을 유지하는데 이는IVING에 일본의 복막투석 환자 15명을 대상으로 MHBP가 InBody S10과 심초음파에 의한 체액상태와 관련이 있는지 알아보았다. 환자들의 평균연령은 66.3±7.7세로 평균 복막투석 이력 28.3±6.4개월, 평균 sMHBP(systolic MHBP)는 128±13mmHg, 평균 sOBP(systolic office BP)는 126±15mmHg였다. sOBP와 sMHBP 모두 총 체수분량/신장²과 같은 체적지표와 신장 기능(renal Kt/V, 혈청 크레아티닌), 심장기능(left ventricular mass index)과 연관성을 보였고, sMHBP와 총 체수분량/신장²의 상관계수는 0.615로 가장 높아 sMHBP는 복막투석환자의 상태를 가장 잘 예측하는 독립적인 요인이다. 이에 sMHBP는 총 체수분량, 근육량, 체지방률과 유의한 상관관계를 보였고, Sodium 섭취는 sMHBP와만 상관성을 보였다.

BIA, 심장기능, 신장기능에 의한 체액상태와 뉴트륨 섭취는 sOBP보다 sMHBP와 더 높은 연관성을 보였으며, MHBP와 BIA에 의한 체성분은 복막투석환자의 체액상태를 모니터링하는데 유용하다.
Edema index measured by bioelectrical impedance analysis as a predictor of fluid reduction needed to remove clinical congestion in acute heart failure

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SUMMARY

Based on the fact that achievement of dry weight without sign of clinical congestion at the time of discharge is considered a surrogate marker of successful treatment in acute heart failure, this study aimed to determine whether BIA could predict the dry weight of acute heart failure patients. InBody S10 was used to measure the ECW ratio (ECW/TBW, extracellular water/total body water) of 60 acute heart failure patients in Japan. The weight before discharge was recorded as the dry weight, and the patients were divided into two groups; those who lost more weight during hospitalization more than the median (4.30 kg), and those who lost less. Mean ECW ratio was 0.400 ± 0.019, and ECW ratio in higher weight reduction group was statistically larger compared with that in lower weight reduction group (0.406 ± 0.021 vs. 0.394 ± 0.015, p = 0.012). Factors such as weight on admission, left ventricular ejection fraction, IVC diameter, and albumin were significantly different between groups. SBP, creatinine, and N-terminal pro-B-type natriuretic peptide were similar between the groups. Multivariate linear regression analysis revealed that male sex, IVC diameter on expiration, ECW ratio, and weight on admission were significant independent predictors of required weight reduction. Model equations for predicting required weight reduction developed are as follows.

[Multivariate model]
Weight reduction (kg) = 6.0628-2.31 (if male) + 0.25 (IVC-20) + 100.62 (EI-0.39) + 0.13 (Weight-65)
*IVC: inferior vena cava/ EI: Edema Index (= ECW ratio = ECW/TBW)

Therefore, ECW ratio is a useful predictor of the amount of weight reduction needed to reach dry weight in acute heart failure treatment. Quantitative assessment of clinical congestion is helpful for avoiding excess volume reduction and persistent congestion in acute heart failure.
급성심부전을 치료하는데 있어 중요한 요인은 퇴원 시 울혈이 없는 상태에서의 건체중이라는 점에 따라, BIA장비가 급성심부전 환자들의 건체중을 예측할 수 있는지 알아보기 위해 InBody S10을 사용하여 일본의 급성심부전 환자 60명의 ECW ratio(ECW/TBW, extracellular water/total body water, 세포외수분비)를 측정하였다. 건체중은 퇴원 전 기록한 체중으로 설정하였고, 환자들은 입원 중 중간값(4.30kg)보다 체중이 더 많이 감소한 그룹과 더 적게 감소한 그룹으로 나뉘었다.

평균 ECW ratio는 0.400±0.019였고, 높은 체중 감소 그룹은 낮은 체중 감소 그룹에 비해 baseline의 ECW ratio가 유의하게 높았다(0.406±0.021 vs. 0.394±0.015, p=0.012). 입원 시의 체중, 좌심실 박출률, 날숨 시 하대정맥 직경, 일부인 수치는 그룹 간 유의하게 달랐지만 입원 시의 SBP, creatinine, N-terminal pro-B-type natriuretic peptide는 그룹 간 유의한 차이가 없었다. 다변량 회귀분석 결과, 남성, 날숨 시 하대정맥 직경, ECW ratio, 입원 시 체중은 체중 감소 필요량을 예측하는데 유의한 독립변수라는 것을 알 수 있었다. 이에 대한 결과와 방정식은 다음과 같다.

**[Multivariate model]**

\[
\text{Weight reduction (kg)} = 6.0628 - 2.31 (\text{if male}) + 0.25 (\text{IVC-20}) + 100.62 (\text{EI-0.39}) + 0.13 (\text{Weight-65})
\]

*IVC: inferior vena cava/ EI: Edema Index(=ECW ratio=ECW/TBW)*

이와 같이, ECW ratio는 심부전 치료 시 건체중에 도달하기 위해 필요한 체중 감소량을 예측하는데 도움이 되는 지표임을 알 수 있다. 따라서, InBody로 측정된 ECW ratio는 건체중을 예측하여 심부전 환자의 울혈과 체액저류를 예방하는데 활용될 수 있다.
Effectiveness of cardiac rehabilitation for prevention and treatment of sarcopenia in patients with cardiovascular disease


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ABSTRACT

Objective: Sarcopenia is a syndrome characterized by progressive and generalized loss of skeletal muscle mass and strength, with the risk of frailty and poor quality of life. This study aimed to clarify the clinical characteristics of sarcopenia and to investigate the effects of comprehensive cardiac rehabilitation (CCR), including nutrition, physical exercise and medication, in patients with cardiovascular disease (CVD).

Methods: We retrospectively studied 322 inpatients with CVD (age 72±12 years). Muscle mass, muscle strength and physical performance were assessed before and after exercise training in patients with and without sarcopenia, which was defined as either a gait speed of <0.8 m/s or reduced handgrip strength (<26 kg in males and <18 kg in females), together with lower skeletal muscle index (SMI) (<7.0 kg/m² in males and <5.7 kg/m² in females). The actual daily total calorie and nutrient intake was also calculated.

Results: Sarcopenia was identified in 28% of patients with CVD, these patients having a higher prevalence of symptomatic chronic heart failure and chronic kidney disease. SMI was significantly associated with protein intake and statin treatment. The ratio of peak VO₂ and SMI was significantly higher in the statin treatment group. Handgrip strength, gait speed, leg weight bearing index, and nutritional intake improved after exercise training in patients both with and without sarcopenia.

Conclusions: The present findings suggest that CCR is a promising strategy for prevention and treatment of sarcopenia in patients with CVD.

심혈관질환 환자의 사르코페니아 특징과 심장재활의 효과를 알아보았다. 평균연령 72±12세의 일본인 심혈관질환 환자 322명을 대상으로 InBody S10을 이용하여 총 체수분량, 체지방량, 제지방량 등을 측정하였다. 이외에 영양상태, 운동 전후 칼로리 및 영양소 섭취량, 근력, 보행속도를 평가하였다. AWGS 기준에 따라 보행속도가 <0.8m/s 이거나 약력이 남 <26kg, 여 <18kg인 경우 + SMI(Skeletal muscle mass index, 골격근량/신장²)가 남성 <7.0 kg/m², 여성 <5.7kg/m²인 경우를 사르코페니아로 진단하였다. 심장재활은 매일 20-40분간 유산소운동, 저항성운동, 균형운동으로 구성된 운동 프로그램을 이용하였다.

환자의 28%는 사르코페니아에 속하였고, 사르코페니아가 있는 군은 만성심부전과 만성신부전의 비율이 높았으며, 연령이 유의하게 높았다. 단백질 섭취는 SMI, 약력, 보행속도와 유의한 관련성이 있었으며, 사르코페니아 진단을 위한 단백질 섭취량의 cutoff는 64g/day였다. 사르코페니아가 없는 군의 SMI는 운동 이후 감소하였지만, 사르코페니아가 있는 군은 SMI의 유의한 변화가 없었다. 스타틴약물을 복용하고 있는 경우는 SMI와 유의한 관련성을 보였는데(β=0.1594, F=4.4602, p<0.05) 스타틴 중에서도 lipophilic 스타틴류를 복용하는 경우의 SMI가 가장 유의하게 높았다. 또한, 스타틴류 복용군에서는 복용하지 않는 군에 비해 최대 VO₂/Wt가 유의하게 높았다.
Efficacy of bioelectrical impedance analysis during the perioperative period in children

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ABSTRACT

We evaluated the efficacy of bioelectrical impedance analysis (BIA) during the perioperative period by estimating the preoperative and postoperative body fluid status. After obtaining informed consent, we enrolled 100 children (3–12 years of age) scheduled for elective surgeries. All children had been fasted preoperatively. The children’s body fluid status was estimated using a BIA machine (InBody S10; Biospace, Korea) in the ward on the afternoon before surgery (baseline), just before surgery and immediately after surgery. The total administered fluid volume during the fasting period, total administered fluid volume during the operation and fasting time were recorded. Continuous data are shown as mean ± standard deviation, and Pearson’s correlation analysis was used to assess relationships between the preoperative fluid deficit and intracellular water (ICW)/extracellular water (ECW) changes. The mean fasting period was 13.3 h (range 5.8–19.7 h). A weak positive correlation was shown between the ICW and fluid deficit during the fasting period (Pearson correlation coefficient = 0.254; P = 0.010). A stronger positive correlation was shown between the ECW and fluid deficit during the fasting period (Pearson correlation coefficient = 0.359; P < 0.001). The baseline and postoperative ICW showed a strong positive correlation (Pearson correlation coefficient = 0.992, P < 0.001), as did the baseline and postoperative ECW (Pearson correlation coefficient = 0.990, P < 0.001). Also there was no dehydration and irritability on medical recording preoperatively. BIA may be an alternative method for estimating the perioperative fluid status in children and determining details of fluid administration.

BIA 측정이 소아의 수술(이비인후과, 안과, 비뇨기과, 성형외과, 정형외과 수술)기간 동안 총 체수분량, 세포내수분량, 세포외수분량과 같은 hydration 상태를 평가하는데 유용한지 알아보기위해 3-12세의 한국인 소아 100명을 대상으로 InBody S10을 이용하여 수술 전 free intake 상태(baseline), 수술 전 공복상태, 수술 직후에 누운 자세로 세포내수분량, 세포외수분량을 측정하였다. 수술 전 공복 상태에서는 하트만용액 또는 생리식염수를 투여하였다. 수술 전 평균 공복시간은 13.3시간, 공복시간 동안 투여된 fluid 양은 요구되는 fluid 양보다 훨씬 낮았다(320 vs 934mL). Baseline 상태에서 측정한 세포내수분량과 세포외수분량은 평균값보다 낮은 값이었다(세포내수분량 : 10.4 cs 12.6L, 세포외수분량 : 6.6 vs 7.9L). 수술 전 공복 상태에서는 수액을 공급했지만 평균 세포내수분량과 세포외수분량은 각각 10.4L, 6.5L로 추정값보다는 낮아 일부는 dehydration 상태를 보였다. 세포내수분량은 공복기간 동안 체액 부족 상태와 약한 비례관계(Pearson correlation coefficient=0.254, p<0.010), 세포외수분량은 강한 비례관계를 보였다(Pearson correlation coefficient=0.359, p<0.001). 수술 시행 동안 fluid treatment에도 불구하고 일부는 dehydration 상태로 수술 후 세포내수분량과 세포외수분량은 평균 10.5L, 6.5L로 여전히 낮은 상태였다. BIA로 환아들의 체액 상태를 평가한 결과, 몇몇 환아들은 수술 전후 기간동안 잠기간의 공복 상태를 겪어 fluid 공급에도 불구하고 약간의 dehydration 상태를 보였다. 이를 통해 BIA는 fluid 투여량을 결정하고 소아의 수술 전후에 걸친 체액 상태를 평가하는 좋은 대안이 될 수 있음을 보여준다.

* 체액 부족 산출 : The fluid deficit during the NPO period was calculated using the fluid replacement volume necessary(hour fluid requirement based on body weight multiply fasting hour) and actual fluid administered during fasting period.
Factors related to skeletal muscle mass in the frail elderly

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ABSTRACT

It is important for the elderly to maintain their skeletal muscle mass, which in turn helps to maintain physical functions. This study aimed to clarify factors related to skeletal muscle mass maintenance. Home-bound elderly (94 men and 216 women), at least 75 years of age, attending a day-care center in Tokyo, were enrolled in this study. Dentists specializing in dysphagia rehabilitation evaluated skeletal muscle mass, occlusal status and swallowing function. Physical function, cognitive function and nutritional status were also evaluated by interviewing caregivers. Correlations of skeletal muscle mass with various factors were determined in each gender group. Multiple regression analysis revealed that skeletal muscle mass was significantly related to nutritional status in both men and women. In men, there was a significant difference in skeletal muscle mass between those with and without occlusion of the natural teeth. Our results suggest that dental treatments and dentures would be useful for maintaining skeletal muscle mass, especially in men.

* Janssen 공식
SMM = 0.401 x [Ht2/R] + 3.825 x sex – 0.071 x age + 5.102
Malnutrition assessed by phase angle determines outcomes in low-risk cardiac surgery patients

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Clinical Nutrition

ABSTRACT

Background & Aims: Phase angle (PA), which is obtained from bioelectrical impedance analysis (BIA), is a non-invasive method for measuring altered electrical properties of biological tissues. It has been recognised as an objective prognostic marker of disease severity and frailty. The aim of this study is to determine whether PA is a marker of malnutrition and postoperative morbidity in low operative risk patients undergoing cardiac surgery.

Methods: A prospective study was conducted in a tertiary hospital. The nutritional state of the cardiac surgery patients was evaluated using BIA the day before the scheduled surgery. After applying selection criteria, 342 low operative risk patients were selected and classified into two groups in accordance with the PA value: a low PA group and a normal PA group. The correlation between low PA and low fat-free mass index (FFMI), a marker of malnutrition, was assessed. Associations between low PA and adverse postoperative outcomes, defined by the Society of Thoracic Surgeons postoperative risk evaluation model, were analysed. The impact of low PA on length of stay in an ICU and hospital was evaluated.

Results: Low PA was detected in 61 (17.8%) patients in the selected group, which consisted of low operative risk patients with a median Euroscore II value of 1.46 (IQR: 0.97-2.03) and was associated with FFMI with Pearson’s R of 0.515 (p < 0.001). Low PA was associated with higher rates (13 [21.3%] vs. 30 [10.7%] p = 0.023) and risk of postoperative morbidity in univariate regression analysis (OR = 2.27, CI 95% = 1.10-4.66, p = 0.026). Furthermore, low PA persisted as an independent factor in multivariate regression analysis (OR = 2.50, CI 95% 1.18-5.29, p = 0.016) adjusted for preoperative risk factors of postoperative morbidity. Evaluation of hospitalisation length revealed a tendency of a prolonged hospitalisation (>14 days) rate (31 [50.8%] vs. 105 [37.8%], p = 0.063) in the group with low PA.

Conclusion: A low preoperative PA is an indicator of malnutrition and determines adverse outcomes after cardiac surgery. Further research is needed to evaluate clinical applications of the PA, such as a more accurate identification of malnourished cardiac surgery patients.
위상각(PA)이 심장 수술을 받는 환자들의 영양불량과 수술 후 이환율의 지표가 될 수 있는지 알아보기 위해, 리투아니아의 20-79세 수술 위험이 낮은 환자 342명을 대상으로 InBody S10을 이용하여 PA와 체성분을 측정하였다. 측정은 수술 하루 전날 실시되었고, 대상자들은 성별과 연령에 따라 아래에서 15th percentile에 해당하는 위상각을 기준으로 낮은 PA, 높은 PA 그룹으로 나누었다. 낮은 PA는 FFMI(fat-free mass index, 제지방량/신장², kg/m²)와 유의한 비례관계를 보였다(r=0.515, p<0.001). 낮은 PA그룹의 수술 후 이환율은 21.3%로 정상의 PA그룹에 비해 유의하게 높은 값을 보였고(높은 PA: 10.7%, p=0.023), 수술 후 이환율 위험은 2.50배인 것으로 나타났다(OR= 2.50, 95% CI 1.18-5.29, p=0.016).
수술 전 낮은 PA은 영양불량의 지표이며, 심장 수술 후의 임상적 결과를 예측하는 독립적인 요인이다. 이에 InBody는 심장 수술을 받는 환자들의 영양불량과 이환율 평가의 유용한 도구가 될 수 있다.
Malnutrition Assessment in Hemodialysis Patients: Role of Bioelectrical Impedance Analysis Phase Angle

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ABSTRACT

Objective: To determine the most potent bioelectrical impedance analysis (BIA) marker of malnutrition and to adjust its application to hemodialysis (HD) patients.

Design: An observational study.

Subjects: A total of 99 patients on maintenance HD were enrolled in the study.

Intervention: The nutritional state of the patients was examined before and after the HD procedure using Subjective Global Assessment Scale (SGA), serum albumin, body mass index and BIA-derived fat-free mass index, reactance, resistance, and phase angle (PA). Malnutrition defined by the SGA questionnaire was used to detect the most potent marker of malnutrition. This marker was further analyzed and corrected for the excess fluid, age, and gender producing the nutritional state-specific cutoffs.

Results: The SGA rates of nutritional state were as follows: 57.6% (57) well nourished, 28.3% (28) moderately malnourished, and 14.1% (14) severely malnourished. Multivariate forward logistic regression analysis of the nutrition markers revealed PA as the most potent malnutrition predictor (odds ratio = 3.69; 95% confidence interval [CI]: 1.59-8.62; P = 0.002). PA was adjusted for the excess fluid (5.00 ± 0.97 vs 4.87 ± 1.08 P < 0.001). Patients were assigned into groups with adjusted PA values below the 5th through the 50th percentile of the mean PA reference value. The moderately malnourished patients were most accurately identified by the percentile group of <25th (area under the curve = 0.70; 95% CI: 0.60-0.81; P = 0.001), and the severely malnourished patients were most accurately identified by the percentile group of <15th (area under the curve = 0.74; 95% CI: 0.62-0.85; P = 0.005).

Conclusion: Malnutrition is present almost in a half of the HD patients. BIA-provided PA is the most potent predictor of malnutrition. PA can be adjusted for the excess fluid after HD, age, and gender and used accordingly.

평균연령 58.7±14.38세의 리투아니아 유지 혈액투석 환자 99명을 대상으로 InBody S10을 이용하여 세포내수분량, 세포외수분량, 총 체수분량, FFMI(Fat free mass/신장2, 제지방량 지수), Reactance, Resistance, PA를 측정하고, SGA(Subjective Global Assessment), 혈청 알부민, BMI를 이용하여 투석 환자들의 영양상태를 평가하였다.

SGA 평가에 따르면 환자들의 57.6%는 영양상태 양호, 28.3%는 영양상태 보통, 14.1%는 영양상태 불량에 속하였고, 전체 대상자의 PA 평균은 4.88±1.08이었다. 다변량 로지스틱 회귀분석 결과, SGA에 의한 영양상태 평가에 있어 PA은 영양상태 위험의 가장 강력한 예측인자였다(OR=3.69, p<0.002). PA 값에 따라 환자들을 분류할 경우 5th percentile 미만이 27.3%, 50th percentile 미만이 85.9%로, 보통의 영양상태는 <25th percentile (AUC =0.7, p<0.001), 심각한 영양상태는 <15th percentile (AUC =0.74, p<0.005) 군에 속하였다.

BIA를 통해 측정한 PA는 영양상태 평가의 가장 정확하고 적절한 방법이다. 또한, 체액과의 이상변성과 연령은 BIA 적용에서 가장 중요한 제한점인데, PA는 이러한 요인들에 상관없이 상황에 순응하여 활용될 수 있다.
Nutritional Status and Body Composition in Korean Myopathy Patients

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Clinical Nutrition Research
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ABSTRACT

Abstract

In myopathy patients, fat mass increases as the disease progresses, while lean body mass decreases. The present study aimed to investigate the overall nutritional status of Korean myopathy patients through surveys of diet and dietary habits, bioelectrical impedance analysis (BIA), and biochemistry tests, as well as the examination of related factors, for the purpose of using such findings as a basis for improving the nutritional status in myopathy patients. The energy intake of all participants was found to be insufficient at only 44.5% of Dietary Reference Intakes for Koreans 2010 (KDRIs 2010), whereas protein intake was sufficient at 89.8% of KDRIs 2010. Dietary fiber intake was found to be 58.4% of sufficient dietary fiber intake for adults according to KDRIs 2010. Calcium intake was found to be 55.0% and magnesium was 14.9% of the recommended calcium and magnesium intake for adults according to KDRIs 2010. With respect to quality of life (QOL), overall increase in QOL domain score showed significant positive correlations with vegetable fat intake (p < 0.05), vegetable protein intake (p < 0.05), and dietary fiber intake (p < 0.05). With respect to BIA, the mean phage angle of all participants was found to be 2.49 ± 0.93°, which was below the cutoff value. As a study that examined nutrient analysis and dietary habits of myopathy patients in Korea, the present study is meaningful in providing the basic data for future studies that aim to present dietary guidelines for patients suffering from myopathy.

Part.11
Plasma B-Type Natriuretic Peptide Levels May Increase Because of Fat Mass Loss by Metformin or Sodium-Glucose Transporter 2 Inhibitors Treatment

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ABSTRACT

Background: Cardiovascular disease (CVD) is the leading cause of death in type 2 diabetes. Metformin reduces cardiovascular events in obese patients with type 2 diabetes, and sodium-glucose transporter 2 (SGLT2) inhibitors decrease cardiovascular events in type 2 diabetic patients with established CVD. However, the underlying mechanisms behind the cardioprotective effects of metformin and SGLT2 inhibitors are unknown.

Methods: Fifteen patients with newly diagnosed type 2 diabetes receiving metformin monotherapy, and seven patients with type 2 diabetes receiving SGLT2 inhibitors combined with other hypoglycemic agents were studied. We investigated changes in glycemic control, plasma B-type natriuretic peptide (BNP) levels, and body composition, 3 and 6 months after starting metformin administration, and 3 months after starting SGLT2 inhibitor administration.

Results: Plasma BNP levels significantly increased after 3 months in both metformin and SGLT2 inhibitors treatment groups (7.9 ± 7.9 pg/mL to 17 ± 16.9 pg/mL, P = 0.012; 8.8 ± 7.2 pg/mL to 15.5 ± 14.3 pg/mL, P = 0.018, respectively). Fat mass significantly decreased in the first 3 months of metformin administration (25.7 ± 10.3 kg to 23.0 ± 11.4 kg, P = 0.046), while fat mass and visceral fat area decreased in three patients receiving SGLT2 inhibitors.

Conclusions: Plasma BNP levels increased because of fat mass loss caused by treatment with metformin and SGLT2 inhibitors. Our results suggest that metformin and SGLT2 inhibitors could reduce the risk of CVD by exerting cardioprotective effects through elevated BNP levels in patients with type 2 diabetes.
Predictors of poor cognitive status among older Malaysian adults: baseline findings from the LRGS TUA cohort study

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Aging Clinical and Experimental Research
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ABSTRACT

Background : Concepts of successful aging (SA), usual aging (UA), and mild cognitive impairment (MCI) have been developed to identify older adults at high risk of Alzheimer's diseases (AD), however, the predictors have rarely been investigated in a single study. Thus, this study aims to explore the risk factors of MCI as compared to UA and SA among older adults, in a large community based cohort study in Malaysia.

Method : 1993 subjects from four states in Malaysia were recruited. A comprehensive interview-based questionnaire was administered to determine socio-demographic information, followed by assessments to evaluate cognitive function, functional status, dietary intake, lifestyle and psychosocial status. Risk factors of cognitive impairment were assessed using the ordinal logistic regression (OLR).

Result : The prevalence of SA, UA and MCI in this study was 11, 73 and 16 % respectively. OLR indicated that higher fasting blood sugar, hyperlipidemia, disability, lower education level, not regularly involved in technical based activities, limited use of modern technologies, lower intake of fruits and fresh fruit juices and not practicing calorie restriction were among the risk factors of poor cognitive performance in this study.

Conclusion : This study will be a stepping stone for future researchers to develop intervention strategies to prevent cognitive decline.
Ratio of dietary ω-3 and ω-6 fatty acids-independent determinants of muscle mass-in hemodialysis patients with diabetes


ABSTRACT

Objective: ω-3 and ω-6 polyunsaturated fatty acids (PUFAs) are essential nutrients in the human diet and possibly affect muscle mass. We evaluated the association between the dietary ratios of ω-3 and ω-6 PUFAs and muscle mass, indicated as skeletal muscle mass (SMM) and appendicular skeletal muscle mass (ASM), in patients with diabetes undergoing hemodialysis (HD).

Methods: In this cross-sectional study, data on 69 patients with diabetes who underwent standard HD therapy were analyzed. For estimating muscle mass, anthropometric and bioelectrical impedance analyses were conducted following dialysis. In addition, routine laboratory and 3-d dietary data were obtained. The adequate intake (AI) cut-off for ω-3 PUFAs was 1.6 g/d and 1.1 g/d for male and female patients, respectively.

Results: The average age of the participants was 63.0 ± 10.4 y. The mean ratios of ω-3/ω-6 PUFA intake, ω-6/ω-3 PUFA intake, SMM, and ASM of the patients were 0.13 ± 0.07, 9.4 ± 6.4, 24.6 ± 5.4 kg, and 18.3 ± 4.6 kg, respectively. Patients who had AI of ω-3 PUFAs had significantly higher SMM and ASM than did their counterparts. Linear and stepwise multivariable adjustment analyses revealed that insulin resistance and the ω-6/ω-3 PUFA ratio were the independent deleterious determinants of ASM normalized to height in HD patients.

Conclusions: Patients with AI of ω-3 PUFAs had total-body SMM and ASM that were more appropriate. A higher dietary ratio of ω-6/ω-3 PUFAs was associated with reduced muscle mass in HD patients.

n-3와 n-6과 같은 다가불포화지방산은 필수지방산이며 근육량에 영향을 미칠 수 있어, 이 지방산들의 비율과 근육량간의 관련성을 평균연령 63.0±10.4세의 당뇨가 있는 중국인 혈액투석 환자 69명을 대상으로 알아보았다. 투석 후 InBody S10을 활용하여 골격근량을 평가하였다. 환자들은 3일(투석일, 비투석일, 주말중 하루)간의 식이섭취를 기록하였고, n-3와 n-6의 합 및 총 칼로리, 단백질, 포화지방산, 단일불포화지방산, 다가불포화지방산의 3일 평균 섭취량을 분석하였다.

n-3의 충분 섭취(AI, adequate intake, 남 : 1.6g/d 이상, 여 : 1.1g/d이상)군에서는 불충분 섭취군에 비하여 골격근량과사지 골격근량이 유의하게 높았다. n-3/n-6(n-3을 n-6으로 나눈 값)은 골격근량과 비례관계, 특히 사지 골격근량과 유의한 관련성을 보였다(β = 15.89). n-6/n-3은 근육량과 유의한 반비례 관계를 보였고, n-6/n-3와 HOMA-IR은 당뇨가 있는 혈액투석 환자들의 ASM(Appendicular skeletal muscle mass index, 사지 골격근량 지수, kg/m²)의 결정적인 위험요인인 것으로 나타났다(adjusted R² = 0.72).

n-3과 n-6 지방산의 비율은 당뇨를 동반한 혈액투석 환자의 근육고갈에 영향을 주는 인자이며, 특히, n-6/n-3는 근육감소의 독립적인 요인이다.
Relationship Between Respiratory Muscle Strength and Conventional Sarcopenic Indices in Young Adults: A Preliminary Study

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ABSTRACT

Objective: To investigate the relationships between respiratory muscle strength and conventional sarcopenic indices such as skeletal muscle mass and limb muscle strength.

Methods: Eighty-nine young adult volunteers who had no history of medical or musculoskeletal disease were enrolled. Skeletal muscle mass was measured by bioelectrical impedance analysis and expressed as a skeletal muscle mass index (SMI). Upper and lower limb muscle strength were evaluated by hand grip strength (HGS) and isometric knee extensor muscle strength, respectively. Peak expiratory flow (PEF), maximal inspiratory pressure (MIP), and maximal expiratory pressure (MEP) were evaluated using a spirometer to demonstrate respiratory muscle strength. The relationships between respiratory muscle strength and sarcopenic indices were investigated using Pearson correlation coefficients and multiple linear regression analysis adjusted by age, height, and body mass index.

Results: MIP showed positive correlations with SMI (r=0.457 in men, r=0.646 in women; both p<0.01). MIP also correlated with knee extensor strength (p<0.01 in both sexes) and HGS (p<0.05 in men, p<0.01 in women). However, PEF and MEP had no significant correlations with these sarcopenic variables. In multivariate regression analysis, MIP was the only independent factor related to SMI (p<0.01).

Conclusion: Among the respiratory muscle strength variables, MIP was the only value associated with skeletal muscle mass.

고령인의 호흡근력 연구에서 사르코페니아는 만성폐쇄성폐질환을 포함한 호흡기질환과 같은 많은 변수들을 조절하는 조절하는데 어렵다고 언급한다. 본 연구에서는호흡기 질환이 없는 한국의 20-39세의 건강한 젊은 성인 89명을 대상으로 호흡근력과 골격근량, 사지근력과 같은 사르코페니아 지표간의 관련성을 예비연구로 조사하였다. InBody S10으로 골격근량을 측정하였고, 이를 이용하여 SMI(Skeletal muscle mass(kg)/Weight(kg) x 100)을 산출하였다. 이외에 PEF(peak expiratory flow, 최대호기속도), MIP(maximal inspiratory pressure, 최대흡기압), MEP(maximal expiratory pressure, 최대호기압), HGS(hand grip strength, 압력), KES(knee extensor strength, 무릎신근강도)를 측정하였다.

SMI와 호흡근력과의 관련성에서 MIP와 SMI는 강한 비례관계로, 상관계수는 남녀가 각각 0.457, 0.646 (p<0.01 in both sex)으로 유의한 상관성을 보였고, 호흡근력과 사지근력간의 관련성에서 MIP만이 KES와 HGS와 유의한 상관성을 보였다. PEF와 MEP는 사르코페니아 지표와 유의한 관련성이 없었다. 다중회귀분석에 의하면 MIP만이 SMI와 관련된 유일한 독립자료였다(p<0.01).
Sarcopenia is an independent risk factor of dysphagia in hospitalized older people

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Geriatrics & Gerontology International

ABSTRACT

Sarcopenia can cause varying physical function disorders, including dysphagia. Malnutrition, a potential result of dysphagia, can also cause sarcopenia. However, the association between sarcopenia and dysphagia is not fully understood, despite evidence suggesting correlations between deglutition disorders and degenerative loss of muscle mass. The present study investigated the prevalence of dysphagia among patients with sarcopenia, and the association between the two conditions. We included 224 older adults (mean age 82.5 &plusmn; 8.4 years; 37.9% men). Individuals who had a stroke or other diseases that could directly cause dysphagia were excluded. Logistic regression analyses were carried out after adjusting for potential causes of sarcopenia, including malnutrition, a low activity of daily living levels and aging, to investigate the relationship between the skeletal muscle index (SMI), prevalence of sarcopenia diagnosed based on a low SMI and grip strength, and swallowing functions. The Mini-Nutritional Assessment short form was used to assess their nutritional status, and the Barthel Index was used to evaluate their activities of daily living. The prevalences of sarcopenia and dysphagia were 76.8% and 30.0%, respectively. Multivariate analysis showed that Barthel Index, SMI and presence of sarcopenia were significant independent factors for the prevalence of dysphagia, after adjusting for sex, age and nutritional status. Furthermore, subgroup analysis showed that SMI in males, and both hand-grip strength and SMI in females were lower in dysphagic subjects than in non-dysphagic subjects (P < 0.01). Sarcopenia was an independent risk factor for dysphagia among older individuals. However, further studies are required to define causality.

근감소증(Sarcopenia)과 연하장애의 연관성을 알아보기 위해 InBody S10을 사용하여 65세 이상의 일본 노인 224명의 근육근량을 측정하였고, 이것을 기반으로 하여 SMI(Skeletal muscle mass index, 근육근 지수)를 산출하였다. 연하장애의 원인은 FOIS*로 평가하였다.

나이, 영상상태, 일상생활의 신체활동, 근감소증 중 일상생활의 신체활동(OR 0.982, 95% CI 0.972-0.993)과 근감소증(OR 5.911, 95% CI 1.648-21.199)이 연하장애와 연관성이 있었다. 낮은 SMI를 가진 노인을 대상으로 분석한 결과, 남자는 감소된 SMI(r=0.40), 여자는 감소된 SMI(r=0.30)와 약력(r=0.30)이 연하장애와 상관성을 보였다. 연하장애가 없는 남자와 여자의 SMI는 5.94±0.67, 4.64±0.70kg/m²이었고 연하장애를 가진 남자와 여자의 SMI는 5.15±1.11, 4.17±0.15kg/m²였다.

이에 따라, 근감소증은 노인에게 있어 연하장애의 위험요인이라고 말할 수 있으며, InBody를 활용한 근감소증 평가는 노인의 연하장애를 진단하는데 유용하다고 할 수 있다.

* FOIS(functional oral intake scale): 매일의 음식과 음료의 구강섭취량을 평가하여 7점 척도 중 5점 이하일 경우 연하장애로 정의함
The Effects of Body Mass Composition and Cushion Type on Seat-Interface Pressure in Spinal Cord Injured Patients

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ABSTRACT

Objective: To investigate the effects of body mass composition and cushion type on seat-interface pressure in spinal cord injured (SCI) patients and healthy subjects.

Methods: Twenty SCI patients and control subjects were included and their body mass composition measured. Seat-interface pressure was measured with participants in an upright sitting posture on a wheelchair with three kinds of seat cushion and without a seat cushion. We also measured the pressure with each participant in three kinds of sitting postures on each air-filled cushion. We used repeated measure ANOVA, the Mann-Whitney test, and Spearman correlation coefficient for statistical analysis.

Results: The total skeletal muscle mass and body water in the lower extremities were significantly higher in the control group, whilst body fat was significantly higher in the SCI group. However, the seat-interface pressure and body mass composition were not significantly correlated in both groups. Each of the three types of seat cushion resulted in significant reduction in the seat-interface pressure. The SCI group had significantly higher seat-interface pressure than the control group regardless of cushion type or sitting posture. The three kinds of sitting posture did not result in a significant reduction of seat-interface pressure.

Conclusion: We confirmed that the body mass composition does not have a direct effect on seat-interface pressure. However, a reduction of skeletal muscle mass and body water can influence the occurrence of pressure ulcers. Furthermore, in order to minimize seat-interface pressure, it is necessary to apply a method fitted to each individual rather than a uniform method.

체수손상(SCI, spinal cord injured) 환자의 seating 압력이 높다고 밝혀져, SCI환자와 건강인 그룹의 seat-interface pressure에서의 체성분과 쿠션 타입의 영향을 알아보기 위해 한국의 SCI 환자 20명(평균연령 53.6±17.95세), 건강인 20명(평균연령 27.5±2.54세)을 대상으로 InBody S10을 이용하여 골격근량, BMI, 체지방량, 부위별 체수분량을 측정, seat-interface pressure는 휠체어의 앞단 자세에서 3종류의 펫포널에 따라 측정하였다.

두 군에서의 몸통 골격근량은 서로 유사했지만, 건강인군의 골격근량, 하지 골격근량, 총 체수분량은 SCI군에 비하여 유의하게 높았고, SCI군에서는 체지방량이 유의하게 높았다. 두 군에서 측정된 모든 체성분은 seat-interface pressure와 유의한 관련성을 보이지는 않았고, SCI군의 seat-interface pressure는 쿠션의 종류 또는 앞단 자세에 상관없이 유의하게 높았다. 또한, seat-interface pressure는 쿠션의 종류에 따라서 유의한 차이를 보였지만, 자세에 따라서는 유의한 차이가 없었다. 체성분은 seat-interface pressure에 직접적인 영향을 미치지 않았지만, 골격근량과 총 체수분량 감소는 육체활동에 영향을 미칠 수 있으므로, 육체적 영향을 주는 seat-interface pressure를 최소화하기 위해 InBody를 활용한 골격근량과 총 체수분량의 구준한 모터링이 요구된다.
Effects of nucleos(t)ide analogues on body composition in HBV infected men age- and BMI-matched, cross-sectional study

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Nutrition
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ABSTRACT

Objective: Chronic hepatitis B (CHB) requires long-term treatment with nucleos(t)ide analogs (NAs). The goal of the present study was to evaluate the effects of long-term treatment with NAs on body composition in men with CHB.

Method: We performed a cross-sectional study of men infected with hepatitis B virus (HBV) who have never been on NAs with high HBV-DNA (naïve group; \( n = 30 \)), those on NAs for 7 years with virologic suppression (NA-treated group; \( n = 50 \)), and healthy men (control group; \( n = 30 \)) matched by age and body mass index (BMI) to evaluate whether body composition differed. Body composition was assessed by multiple-frequency bioelectrical impedance analysis. All patients and healthy controls underwent anthropometric measures, dietary intake, and physical activity level survey.

Results: Body fat mass (BFM) and visceral fat area (VFA) were significantly lower in HBV-infected men naïve to NAs than in controls \(( P < 0.05 \) ). With virology suppression after treatment with NAs, BFM, VFA, and waist-to-hip ratio (WHR) were significantly increased in the NA-treated group compared with the naïve group \(( P < 0.05 \) ). Although there were no significant differences in BFM, VFA, and WHR between NA-treated men and controls \(( P > 0.05 \) ), WHR in the NA-treated group was \( 0.94 \pm 0.06 \), indicating central obesity. Liver function, liver stiffness measurement, dietary intake, and physical activity level were the same between NA-treated and naïve men with CHB.

Conclusions: BFM and VFA is elevated in CHB men on NAs with virologic suppression compared with age and BMI-matched NA-naïve CHB men, which suggests that NAs may increase BFM and VFA of CHB men by virologic suppression. Further study is needed to clarify the adverse effects related to metabolic complications of lipid metabolism due to NA therapy.
Handgrip Strength Index Predicts Nutritional Status as a Complement to BMI in Crohn’s Disease

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Journal of Crohn’s and Colitis
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ABSTRACT

Background: Body mass index [BMI] is widely used to measure nutritional status in Crohn’s disease [CD] patients, but limitations remain. Measuring handgrip strength index, in addition to BMI, may aid in overcoming limitations.

Methods: A total of 150 patients with CD and 254 controls were included in this study. All patients and controls underwent BMI, handgrip strength and bioelectrical impedance analysis. Bioelectrical impedance analysis included body cell mass, bone mineral content, skeletal muscle mass and body fat mass. A total of 88 CD patients were age-, sex- and BMI-matched with healthy controls for further analysis.

Results: BMI, body cell mass, body cell mass index, handgrip strength and handgrip strength index were all significantly decreased in the group of CD patients compared with controls [p < 0.0001]. When paired by BMI, healthy controls had significantly increased body cell mass index [p = 0.0344] and handgrip strength index [p = 0.0010] compared to patients. In addition, handgrip strength was well correlated with body cell mass [r = 0.8365, p < 0.0001].

Conclusions: BMI is widely used for detecting malnutrition, but it is less sensitive in predicting loss of body cell mass and skeletal muscle mass. Our study shows that handgrip strength index is an effective and convenient parameter to predict the functional nutritional status and muscular health in CD patients.
Should we treat obesity in COPD? The effects of diet and resistance exercise training

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Respirology

ABSTRACT

Background and Objective: Obesity is an established risk factor for poor health outcomes, but paradoxically in chronic obstructive pulmonary disease (COPD), it is associated with improved survival and lung function. A major evidence gap exists to inform treatment recommendations for patients with COPD who are obese. We aimed to determine the effect of weight reduction involving a low-energy diet utilizing a partial meal replacement plan, coupled with resistance exercise training in obese COPD patients.

Methods: In a proof of concept before-after clinical trial, obese (body mass index ≥30 kg/m²) COPD patients received a 12 week weight reduction programme involving meal replacements, dietary counselling by a dietitian and resistance exercise training prescribed and supervised by a physiotherapist. Patients were reviewed face to face by the dietitian and physiotherapist every 2 weeks for counselling.

Results: Twenty-eight participants completed the intervention. Mean (standard deviation) body mass index was 36.3 kg/m² (4.6) at baseline and reduced by 2.4 kg/m² (11.1) P < 0.0001 after the intervention. Importantly, skeletal muscle mass was maintained. Clinical outcomes improved with weight loss including exercise capacity, health status, dyspnea, strength and functional outcomes. There was also a significant reduction in the body mass index, obstruction, dyspnea and exercise score (BODE). Systemic inflammation measured by C-reactive protein however did not change.

Conclusion: In obese COPD patients, dietary energy restriction coupled with resistance exercise training results in clinically significant improvements in body mass index, exercise tolerance and health status, whilst preserving skeletal muscle mass. This novel study provides a framework for development of guidelines for the management of obese COPD patients and in guiding future research.

비만은 COPD 환자의 위험 요인으로, 저항성 운동과 함께 저칼로리 식단을 통한 체중감소가 이 환자들의 골격근량을 유지시키면서 COPD 증상과 전제적인 영증을 개선시키는지 알아보고자 한다. BMI 30이상인 호주의 COPD 환자 28명을 대상으로 InBody720을 이용하여 골격근량과 체지방율을 측정하였다.(사지 골격근량은 DEXA로 측정) 식이 조절은 하루 920~1195칼로리, BMI 40을 넘으면 1410 칼로리까지 제공하였고, 운동은 가정에서 할 수 있는 이두근 운동, 슬마프레스, 푸쉬업, 스퀴트, 스쿼트, 런지 등을 처방받았다.

식이와 운동 intervenion 이전인 0주와 이후인 13주차에 체성분, SGRQ, 건강상태, BODE index(BMI, obstruction, dyspnea), 6MWD(6분간 이동거리)를 평가하였다. 13주간의 intervention 결과, 골격근량과 사지 골격근량 지수는 유의한 변화없이 유지된 상태에서 BMI, 체지방율, 체지방률은 유의하게 감소하였다(all p<0.0001). 그 외 SGRQ, 6MWD, BODE index, 어깨외전근력 또한 유의하게 개선되었다. CRP와 같은 염증지표는 유의적인 변화가 없었다.
The Effect of anti-TNFα Induction Therapy on the Nutritional Status and Dietary Intake in Inflammatory Bowel Disease

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Journal of gastrointestinal and liver diseases

ABSTRACT

Background and Aims: Patients suffering from inflammatory bowel disease (IBD) are at a high risk of malnutrition and retain an altered body composition. We hypothesized that anti-tumor necrosis factor (anti-TNF) alpha therapy may improve dietary intake and have a beneficial influence on body composition in these patients.

Methods: Our study involved 40 IBD outpatients (33 Crohn’s disease, 7 ulcerative colitis); 24 of these received adalimumab (160/80/40EOEw) and 16 were treated with infliximab (5 mg/kg at week 0, 2, 6, and subsequently every 8 weeks). Body composition was measured with bioelectrical impedance analysis, while dietary intake was recorded prior to initiating biologicals and 3 months afterwards. Body composition indexes: fat-free mass index [FFMI], body fat mass index [BFMI]) were calculated in kg/m².

Results: Baseline BMI (kg/m2) and muscle parameters increased significantly at the end of the observational period (BMI: 23.81±7.19 vs. 24.52±7.34, p<0.001; FFMI: 17.64±3.00 vs. 18.14±3.08, p<0.001; at week 0 vs. 12, respectively). However, no significant changes were detected in the fat parameters (BFMI: 6.21±5.20 vs. 6.44±5.27, respectively). We found no significant difference between the effects of adalimumab vs. infliximab on body composition (deltaFFMI: 0.55±0.82 vs. 0.43±0.69; deltaBFMI: 0.23±0.85 vs. 0.21±1.01, respectively). No significant difference was observed in the extent of changes in parameters whether the patients were on corticosteroids (n=15) or not (n=25) at week 0 (deltaFFMI: 0.44±0.84 vs 0.59±0.72; deltaBFMI: 0.36±1.12 vs. 0.09±0.71, respectively).

Conclusion: Our findings suggest that muscle parameters improved during the anti-TNF induction therapy, while fat parameters did not change significantly. Thus, induction anti-TNF therapy might have a beneficial effect on body composition.

염증성 장질환(IBD, inflammatory bowel disease) 환자는 영양불량으로, 체성분 상태가 변화된다. 본 연구에서는 헝가리의 IBD 환자 40명(크론병 33명, 궤양성 대장염 7명)을 대상으로 anti-TNFα(anti-tumor necrosis factor alpha, 항증앙괴사인자) 치료가 식이섭취를 증가시키고, 체성분에 이로운 영향을 미치는지 알아보았다. InBody720을 활용하여 0주, 치료 후 12주차에 체지방량, 체지방량, 골격근량, 총 체수분량, 세포외수분량, 세포내수분량 등을 측정하였다. 12주 후, BMI, FFMI(Fat Free Mass/height², 체지방량 지수), SMI(Skeletal muscle mass index), 체세포량의 유의한 변화가 있었고(all p<0.001), 주요 지방지표에는 유의한 변화가 없었다. 성별을 나누면, 남성 환자의 경우 FFMI, SMI같은 근육지표의 유의한 변화가 있었다. 치료 후 FFMI 평가로는 30% 정도, SMI로는 12.5%가 사르코페니아의 위험이 있었으나, 치료 후, 각각 25%, 5%로 그 위험률이 감소하였다. 질환의 중증도에 따라 mild, moderate, severe 군으로 분류할 경우, 영지 질환 군 일수록, FFMI, SMI, SLMI(soft lean mass index)의 개선이 더 컸던 반면, 지방 지표들은 유의한 변화가 없었다.
IBD 환자의 anti-TNFα 치료가 체성분에 긍정적인 영향을 주며, 이는 InBody의 근육, 체지방 측정을 통해 알 수 있었다.
The Impact of Fluid Overload and Variation on Residual Renal Function in Peritoneal Dialysis Patient

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Journal of gastrointestinal and liver diseases

ABSTRACT

Background: The effect of fluid overload and variation on residual renal function (RRF) in peritoneal dialysis (PD) patients is controversial.

Methods: Retrospective cohort study was designed. One-hundred and ninety PD patients with measured glomerular filtration rate (mGFR) ≥ 3 ml/min/1.73 m2 were recruit. Fluid status of every participant was assessed by bioelectrical impedance analysis (BIA) every 3 months for 1 year. The cohort was divided into three hydration groups, namely persistent overhydration (PO) group, intermittent overhydration (IO) group and normal hydration (NH) group. Additionally, participants were also divided into high or low fluid variation groups. The decline rate of RRF and the event of anuria were followed up for 1 year. The association of fluid overload with RRF loss was evaluated by Cox proportional hazard models adjusted for confounders.

Results: Thirty-six (18.9%) patients developed anuria. The decline rate of mGFR in both PO and IO groups were significantly faster than that of NH group (PO vs NH: -0.2 vs -0.1 ml/min/1.73 m2/month, p < 0.01; IO vs NH: -0.2 vs -0.1 ml/min/1.73 m2/month, p < 0.01). Kaplan-Meier analysis showed poorer RRF outcome in both PO and IO groups compared with that of NH group (PO vs NH: p < 0.001; IO vs NH: p = 0.006). Patients with high fluid variation had worse RRF survival than those with low fluid variation (p = 0.04). Adjusted Cox regression models indicated the hazard ratio of RRF loss in PO group was 8.90-folds higher (95% confidence interval 3.07-31.89) than that in NH group.

Conclusions: These findings suggested fluid overload was independently associated with the decline of RRF in PD patients.
The ratio of skeletal muscle mass to visceral fat area is a main determinant linking circulating irisin to metabolic phenotype

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ABSTRACT

Background: The aims of this study were to investigate whether circulating irisin is associated with favorable metabolic parameters and how the association differs according to body composition in humans.

Methods: A total of 424 subjects (233 men and 191 women), aged 23–73 years (mean age 47.1 years), were enrolled from the Seoul Metro City Diabetes Prevention Program. Body composition was determined using an impedance body composition analyzer, and serum irisin level was measured using a commercial kit.

Results: Serum irisin was correlated with favorable metabolic parameters including less obese, lower blood pressure and glucose levels and healthy lipid parameters. The skeletal muscle mass to visceral fat area ratio (SVR) was positively correlated with the serum irisin concentration ($r = 0.10, P = 0.04$). When the study subjects were divided into tertiles according to their SVR, serum irisin was correlated with favorable metabolic phenotypes in those subjects in the upper tertile. However, there were no such correlations in the lower tertile. In addition, serum irisin was inversely related to pre-diabetes/type 2 diabetes (T2D) independent of other risk factor for T2D and insulin resistance [OR (95 % CI); 0.66 (0.49–0.90), $P = 0.009$].

Conclusions: The compositions of skeletal muscle and visceral fat play key roles in the association between circulating irisin and a patient’s metabolic phenotype.

Irisin은 새로운 myokine으로 피지방 지방세포의 열생산을 유도하고, UCP-1의 레벨을 증가시키므로 에너지 대사에 있어 운동의 이로운 효과를 주는 역할을 한다. 본 연구에서는 이러한 irisin이 체성분에 따라 긍정적인 대사지표와 관련이 있는지 알아보았다. 23-76세의 당뇨예방 프로그램에 등록된 한국인 424명을 irisin 레벨에 따라 3개의 군으로 나누었고, InBody720을 이용하여 체성분을 측정하였다.

Irisin 레벨은 대사증후군이 없는 경우가 있는 경우에 비해 유의하게 높은 값을 보였다(p=0.03). Irisin은 골격근량/내장지방단면적과 유의한 비례관계를 보였지만(r=0.10, p=0.042), 체지방량 또는 체지방률과의 관련성이 없었다. 골격근량/내장지방단면적 값에 따라 3개의 tertile로 나 ServletException 경우, irisin은 upper tertile에서 긍정적인 대사지표와 연관성이 있었지만, lower tertile에서는 연관성이 없었다. 또한, irisin은 제2형 당뇨와 인슐린 저항성의 위험인자와 유의한 반비례 관계를 보였다(OR=0.66, p=0.009). Irisin과 대사지표간의 관련성을 알아보는데 골격근량과 내장지방단면적의 구성이 중요한 역할을 한다는 것을 알 수 있었다.

* UCP-1(uncoupling protein-1) : 지방을 태워 열을 내는 단백질로, 미토콘드리아마에 존재함