SICOBEVENTI

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PERUGIA, 9 GIUGNO 2025

ADVANCED BARIATRIC SURGERY
CHIRURGIA BARIATRICA ASSOCIATA AD ALTRI INTERVENTI E CHIRURGIA REVISIONALE

DIETA CHETOGENICA PREOPERATORIA: QUANDO E PERCHE'

ROSCINI ANNA RITA

S.C. MEDICINA INTERNA

AZIENDA OSPEDALIERA DI PERUGIA
UNIVERSITÀ DEGLI STUDI DI PERUGIA

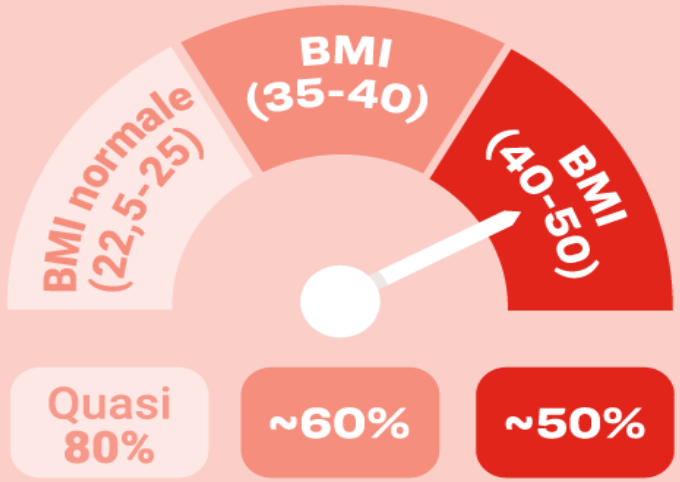
L'epidemia globale di obesità è ampiamente diffusa.[3]

L'obesità negli adulti è più che **duplicata** negli ultimi 3 decenni[4]

~890 milioni di adulti convivono con l'obesità[4]

Nel 2019 un BMI superiore a quello ottimale ha causato ~5 milioni di **morti premature** per malattie non trasmissibili[4]

Probabilità di raggiungere i 70 anni di età sulla base del BMI (kg/m²)[5]



Senza un intervento sul controllo del peso a lungo termine, si prevede che l'obesità continuerà ad aumentare, colpendo **1,5 miliardi di adulti entro il 2035.**[12,*]

Powell-Willey TM et al. Circulation, 2021
World Healt Organization, 2024
Prospective Studies Collaboration Lancet, 2009
World Obesity Federation, 2023

Diagnosi di Obesità

Primo Livello

Adulti/Anziani

- Indice di Massa Corporea
- Circonferenze Corporee (FM%*)
- Pressione Arteriosa
- Analisi Bioimpedenziometrica

Secondo Livello

- Analisi Bioimpedenziometrica
- DXA – Composizione Corporea
- Handgrip test
- Analisi Ematochimiche:
  - HDL
  - Trigliceridi
  - Colesterolo Tot
  - Glicemia
  - Uricemia
  - ALT
  - TSH
  - FT4
  - HbA1c
  - Testosterone Totale (Maschio)

Adulti/Anziani - Definizione del Fenotipo Obeso

- Sindrome Normopeso Obeso
- Normopeso Obeso Metabolicamente Malato
- Obeso Metabolicamente Sano
- Obeso Metabolicamente Malato
- Obeso Sarcopenico
- Obeso Osteosarcopenico

Pediatria

- Indice di Massa Corporea – Curve di Crescita
- Indice di Massa Tri ponderale
- Rapporto Vita/Altezza
- Pressione Arteriosa

Pediatria – Sistemi di Classificazione Obesità

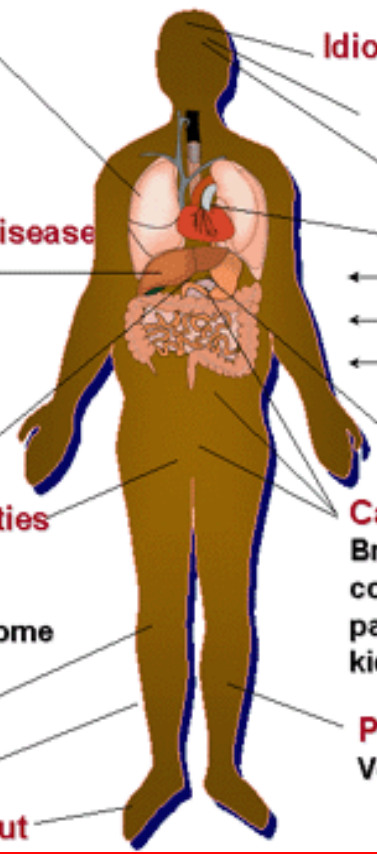
- Normo Peso
- Pre Obeso
- Pre Obeso – Cluster Rischio Cardio Metabolico
- Obeso
- Obeso - Cluster Rischio Cardio Metabolico

*De Lorenzo et al. 2019. Developing and cross-validation of new equations to estimate fat mass in Italian population. Eur Rev Med Pharmacol Sci. 2019.

Formula Donne Fat Mass (kg) = -63.82 + (Circonferenza Vita (cm) × 0.35) + (Circonferenza Fianchi (cm) × 0.61)

Formula Uomini Fat Mass (kg) = -75.84 + (Circonferenza Vita (cm) × 0.38) + (Circonferenza Fianchi (cm) × 0.64)

Medical Complications of Obesity



Pulmonary disease
Abnormal function
Obstructive sleep apnea
Hypoventilation syndrome

Idiopathic intracranial hypertension

Stroke

Cataracts

Nonalcoholic fatty liver disease
Steatosis
Steatohepatitis
Cirrhosis

Coronary heart disease
- Diabetes
- Dyslipidemia
- Hypertension

Gall bladder disease

Severe pancreatitis

Gynecologic abnormalities
Abnormal menses
Infertility
Polycystic ovarian syndrome

Cancer
Breast, uterus, cervix,
colon, esophagus,
pancreas,
kidney, prostate

Osteoarthritis

Phlebitis
Venous stasis

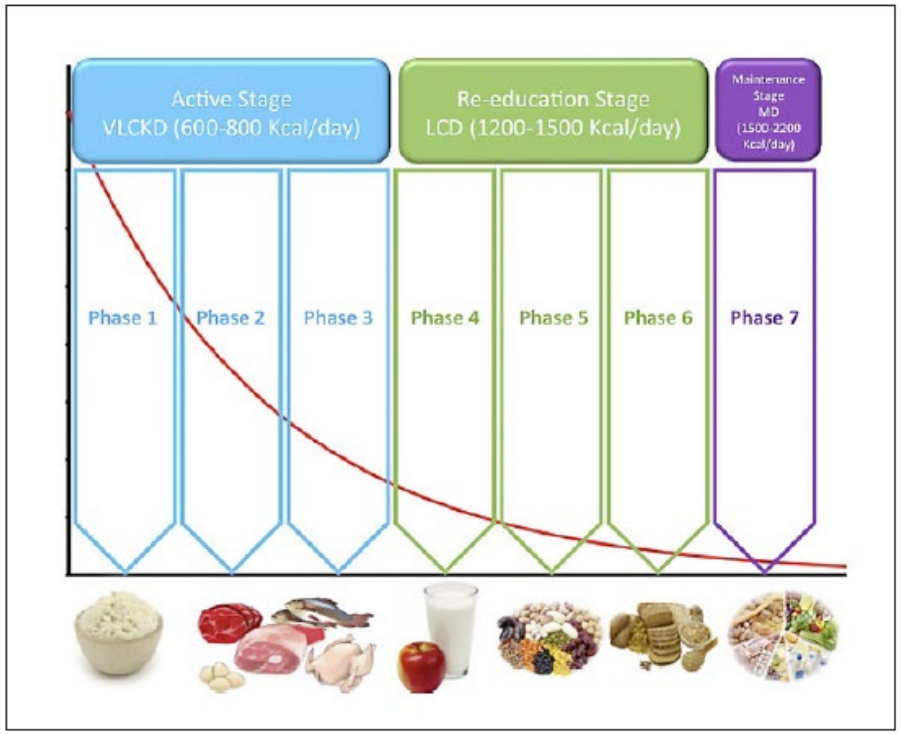
Skin

Gout


INFIAMMAZIONI CRONICHE
- TNF-alpha
- interleuchine
- interferone
COMPROMISSIONI RESPIRATORIE
- obesità
- ipoventilazione
- restringimento polmonare
- atelettasia
- riduzione FRC
- ridotta capacità di espansione polmonare
LIMITAZIONI NELLE CURE CRITICHE
- difficoltà di posizionamento prono
- difficoltà di intubazione
- necessità di maggiore ventilazione
DISFUNZIONI IMMUNITARIE
- disfunzioni T-cell
- risposta anticorpale alterata
COMPLICAZIONI DI COMORBIDITA'
- insulino resistenza
- disfunzioni endoteliali
- problemi cardiovascolari
- ipertensione
DISFUNZIONI ENDOCRINE
- triiodotironina
- testosterone
- cortisolo
PERFUSIONE POLMONARE DANNEGGIATA
- insulto endoteliale
- trombosi vascolare
- angiogenesi
OBESITA'

European Guidelines for Obesity Management in Adults with a Very Low-Calorie Ketogenic Diet: A Systematic Review and Meta-Analysis

Giovanna Muscogiuri[a, b] Marwan El Ghoch[c] Annamaria Colao[a, b] Maria Hassapidou[d] Volkan Yumuk[e] Luca Busetto[f] Obesity Management Task Force (OMTF) of the European Association for the Study of Obesity (EASO)



Background: The very low-calorie ketogenic diet (VLCKD) has been recently proposed as an appealing nutritional strategy for obesity management. The VLCKD is characterized by a low carbohydrate content (<50 g/day), 1–1.5 g of protein/kg of ideal body weight, 15–30 g of fat/day, and a daily intake of about 500–800 calories.

Results: Of the 645 articles retrieved, 15 studies met the inclusion criteria and were reviewed, revealing 4 main findings. First, the VLCKD was shown to result in a significant weight loss in the short, intermediate, and long terms and improvement in body composition parameters as well as glycemic and lipid profiles. Second, when compared with other weight loss interventions of the same duration, the VLCKD showed a major effect on reduction of body weight, fat mass, waist circumference, total cholesterol and triglyceridemia as well as improved insulin resistance. Third, although the VLCKD also resulted in a significant reduction of glycemia, HbA1c, and LDL cholesterol, these changes were similar to those obtained with other weight loss interventions. Finally, the VLCKD can be considered a safe nutritional approach under a health professional's supervision since the most common side effects are usually clinically mild and easily to manage and recovery is often spontaneous. ***Conclusions:*** The VLCKD can be recommended as an effective dietary treatment for individuals with obesity after considering potential contra-indications

Muscogiuri G. et al. Obesity Facts , 2021

CONSENSUS STATEMENT

Ketogenic nutritional therapy (KeNuT)—a multi-step dietary model with meal replacements for the management of obesity and its related metabolic disorders: a consensus statement from the working group of the Club of the Italian Society of Endocrinology (SIE)—diet therapies in endocrinology and metabolism

L. Barrea[1] · M. Caprio[2,3] · E. Camajani[2,3] · L. Verde[4] · S. Perrini[5] · A. Cignarelli[5] · F. Prodam[6,7] · A. Gambineri[8,9] · A. M. Isidori[10] · A. Colao[11,12,13] · F. Giorgino[5] · G. Almaretti[6] · G. Muscogiuri[11,12,13]

Table 1 Definition, classification, and acronym of various ketogenic diets

Diet	Acronym	Kcal	Carbohydrates	Lipids
Isocaloric ketogenic diet	ICKD	Calculated according to TEE	< 30–50 g/day	70–80% of DCI
Low-calorie ketogenic diet	LCKD	> 800 kcal/day but < TEE	< 30–50 g/day	> 30–40 g/day
Very low-calorie ketogenic diet	VLCKD	< 800 kcal/day	< 30–50 g/day	< 30–40 g/day

ICKD isocaloric ketogenic diet; *TEE* total energy expenditure; *LCKD* low-calorie ketogenic diet; *VLCKD* very low-calorie ketogenic diet; *DCI* daily calorie intake

In this practical guide of the working group of the Club of the Italian Society of Endocrinology (SIE)—Diet Therapies in Endocrinology and Metabolism, we report a useful guideline of the multistep KeNuT for the management of obesity and its related metabolic disorders (Fig. ★). KeNuT should be recommended as an effective dietary treatment for individuals with obesity, particularly for patients with severe obesity and/or comorbidities (such as inflammatory, metabolic and cardiovascular diseases) who need rapid and substantial weight loss★. Thus, KeNuT should be prescribed only after a proper clinical assessment by the endocrinologist. In conclusion, this practical guide will help the healthcare provider to acquire the necessary skills to provide a comprehensive care of patients with overweight, obesity and obesity-related diseases, to maintain weight loss in the long term, reduce the risk for complication, improve the outcome of cardiovascular and metabolic rehabilitation, and finally ameliorate overall quality of life★. The KeNuT multistep dietary model should be integrated into a more comprehensive treatment plan, which may also include pharmacological interventions and bariatric surgery, depending on the severity of the disease and on patient's compliance and acceptance.

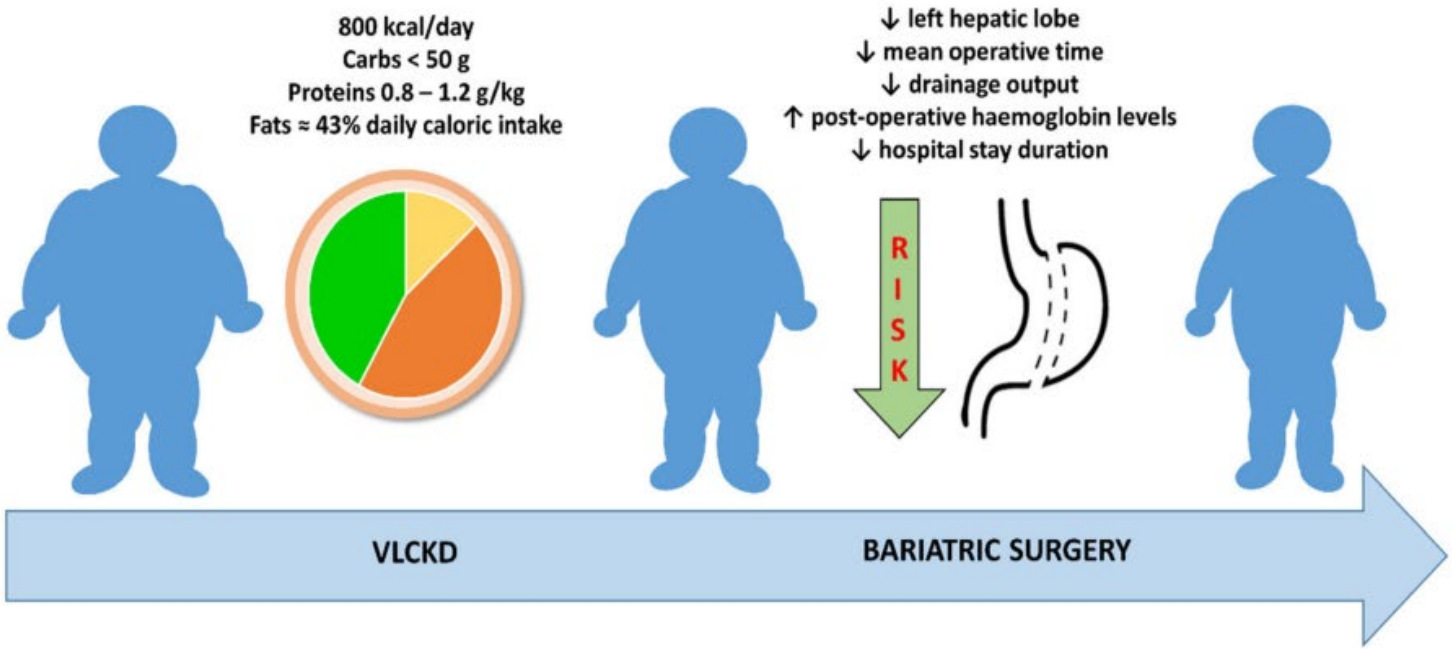
Barrea L. et al . Journal of Endocrinological Investigation, 2024

Review

Ketogenic Diet for Preoperative Weight Reduction in Bariatric Surgery: A Narrative Review

Luca Colangeli [1,2], Paolo Gentileschi [3], Paolo Sbraccia [1,2] and Valeria Guglielmi [1,2,*]

Abstract: Bariatric surgery (BS) is the most effective treatment in reducing weight and the burden of comorbidities in patients with severe obesity. Despite the overall low mortality rate, intra- and post-operative complications remains quite common. Weight loss before BS reduces surgical risk, but studies are inconclusive regarding which is the best approach to apply. In this review, we summarize the current evidence on the effect of a ketogenic diet (KD) before BS. All studies agree that KD leads to considerable weight loss and important improvements in terms of surgical risk, but populations, interventions and outcomes are very heterogeneous. KD appears to be a safe and effective approach to induce weight loss before BS. However, randomized controlled trials with better-defined dietary protocols and homogeneous outcomes are necessary in order to draw firm conclusions.



Colangeli L. et al. Nutrients 2022

nutrients

MDPI

Review

Very Low-Calorie Ketogenic Diet (VLCKD) as Pre-Operative First-Line Dietary Therapy in Patients with Obesity Who Are Candidates for Bariatric Surgery

Luigi Barrea [1,2,*,†], Ludovica Verde [2,3,†], Luigi Schiavo [4], Gerardo Sarno [5], Elisabetta Camajani [6], Antonio Iannelli [7,8,9], Massimiliano Caprio [6,10], Vincenzo Pilone [4], Annamaria Colao [2,11,12] and Giovanna Muscogiuri [2,11,12]

Nutrients **2023**, *15*, 1907

Abstract: Bariatric surgery is currently the most effective method for achieving long-term weight loss and reducing the risk of comorbidities and mortality in individuals with severe obesity. The pre-operative diet is an important factor in determining patients' suitability for surgery, as well as their post-operative outcomes and success in achieving weight loss. Therefore, the nutritional management of bariatric patients requires specialized expertise. Very low-calorie diets and intragastric balloon placement have already been studied and shown to be effective in promoting pre-operative weight loss. In addition, the very low-calorie ketogenic diet has a well-established role in the treatment of obesity and type 2 diabetes mellitus, but its potential role as a pre-operative dietary treatment prior to bariatric surgery has received less attention. Thus, this article will provide a brief overview of the current evidence on the very low-calorie ketogenic diet as a pre-operative dietary treatment in patients with obesity who are candidates for bariatric surgery.

Table 4. Main findings of studies on ketogenic diet before bariatric surgery.

Reference	Population	Aim and Intervention	Findings
Leonetti et al. [108]	19 M; 31 F	Assessment of the effectiveness of a sequential diet regimen termed the OPOD in morbidly obese patients with and without type 2 diabetes mellitus scheduled for bariatric surgery. OPOD regimen: VLCKD for 10 days; VLCD for 10 days; LCD for 10 days.	Reduction in body weight, body mass index, waist circumference, and neck circumference; amelioration in fasting plasma glucose levels; reduction in liver volume; and improvement of liver steatosis.
Albanese et al. [30]	39 M; 139 F	Compared surgical outcome and weight loss in two groups of patients who were offered two different pre-operative diets: VLCD and VLCKD: 72 patients followed a pre-operative VLCKD and 106 a VLCD.	Absolute weight loss was significantly better in the VLCKD than in the VLCD group, while no significant differences were observed in % of excess body mass index loss. VLCKD showed better results than VLCD on surgical outcome, influencing drainage output, post-operative haemoglobin levels, and hospital stay.
Pilone et al. [109]	44 M; 75 F	Evaluation of safety, efficacy, and acceptability of a VLCKD in patients before bariatric surgery using a sequential diet regimen: VLCKD for 10 days, followed by a hypocaloric scheme for 20 days, with the progressive recovery of calorie levels.	Weight, body mass index, waist circumference, and visceral fat decreased significantly. Furthermore, a significant improvement in several clinical parameters, including liver volume and glycaemic and lipid profile parameters were observed. The majority of patients declared themselves satisfied or very satisfied. The adverse effects were mild, of short duration, and not clinically relevant.
Schiavo et al. [110]	10 M; 17 F	To assess the safety and the effectiveness of a 4-week preoperative KMED in reducing body weight and left hepatic lobe volume in patients scheduled for bariatric surgery. Ketogenic food plan (from 1150 to 1250 kcal/day) consisted of 4% carbohydrates, 71% fats, and 25% proteins. Dinner was substituted by Ketocompleat (MVMedical Solutions, Serravalle, Repubblica San Marino). Ketocompleat is a supplement included on the register of food supplements of the Italian Minister of Health (code number 94721), and due to its carbohydrate-free formulation, may be associated to a low-carbohydrate ketogenic diet.	The study indicates that a 4-week preoperative KMED is safe and effective in reducing body weight and left hepatic lobe volume in patients with obesity scheduled for bariatric surgery.

Barrea L. et al.
Nutrients , 2023

Principali risultati degli studi sulla dieta chetogenica

Reference	Population	Aim and Intervention	Findings
Schiavo et al. [111]	22 M; 26 F	To prospectively compare the effects on weight loss, fat mass, fat-free mass, and resting metabolic rate in two groups of patients who were randomized to two different diets: LCKD and a standard LCD after intragastric balloon placement. The macronutrients composition of the LCD and LCKD was 40% carbohydrates, 43% proteins, and 15% fats (~ 1200 kcal/day) and 4% carbohydrates, 25% proteins, and 71% fats (~1200 kcal/day), respectively.	The LCKD group showed a significantly lower decrease in free fat mass and resting metabolic rate when compared with the LCD group. Fat mass decreased more significantly with LCKD compared to LCD, without negative impact on renal function.
Schiavo et al. [112]	44 M; 26 F	To assess the clinical advantage of pre-bariatric surgery CPAP alone or in combination with a LCKD on apnoea–hypopnoea index and CRP levels in patients with obesity and obstructive sleep apnoea syndrome. The ketogenic food plan (from 1150 to 1250 kcal/day) consisted of 4% carbohydrates, 71% fats, and 25% proteins. Dinner was substituted by Ketocompleat (MVMedical Solutions, Serravalle, Repubblica San Marino)	Apnoea–hypopnea index scores improved significantly in both groups. Combining CPAP and LCKD registered no advantage on the apnoea–hypopnoea index score. Furthermore, CPAP + LCKD had a greater impact on CRP levels than CPAP alone demonstrating a positive impact on chronic inflammatory status.

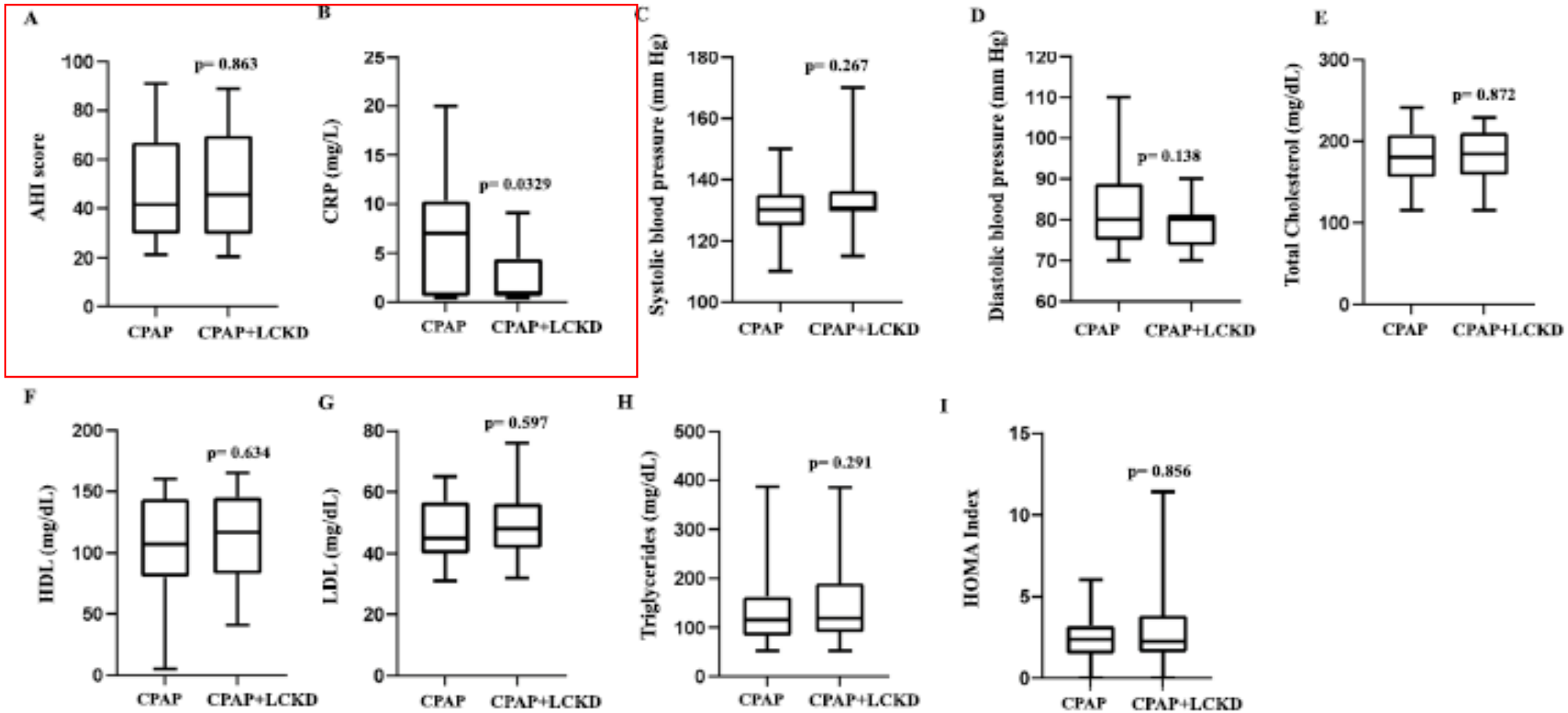
Barrea L. et al. Nutrients, 2023

Low-Calorie Ketogenic Diet with Continuous Positive Airway Pressure to Alleviate Severe Obstructive Sleep Apnea Syndrome in Patients with Obesity Scheduled for Bariatric/Metabolic Surgery: a Pilot, Prospective, Randomized Multicenter Comparative Study

Luigi Schiavo[1] · Roberto Pierro[2] · Carmela Asteria[3] · Pietro Calabrese[1] · Alberto Di Biasio[4] · Ilenia Coluzzi[4] · Lucia Severino[1] · Alessandro Giovanelli[3] · Vincenzo Pilone[1] · Gianfranco Silecchia[5]

Clinical parameters	Groups	Baseline	Follow-up (4 weeks)	p
Body weight	CPAP	132.7 ± 23	131.6 ± 22.3	0.816
	CPAP+LCKD	143.6 ± 23.6	129.7 ± 23.7	0.0052*
BMI	CPAP	47.6 ± 5.9	47.2 ± 5.7	0.756
	CPAP+LCKD	50.1 ± 5.9	45.3 ± 6.5	<0.001*
AHI score	CPAP	63.3 ± 21	47.9 ± 20	0.0023
	CPAP+LCKD	62.7 ± 22.4	50.4 ± 22.7	0.0272*
CRP (mg/L)	CPAP	5.95 ± 5.9	6.36 ± 6.0	0.855
	CPAP+LCKD	6.12 ± 5.96	2.66 ± 2.57	0.0161*
Blood pressure (systolic, mmHg)	CPAP	134.2 ± 10.4	130 ± 9.7	0.0721
	CPAP+LCKD	142.8 ± 13.3	133 ± 11.9	0.0008*
Blood pressure (diastolic, mmHg)	CPAP	87 ± 11.6	82 ± 9.5	0.0623
	CPAP+LCKD	85.4 ± 8.38	78.7 ± 6.43	0.0007*
Insulin (mcU/mL)	CPAP	11 ± 7.04	10.4 ± 6.9	0.696
	CPAP+LCKD	11.8 ± 6.3	10.6 ± 5.6	0.422
HOMA Index	CPAP	2.67 ± 1.71	2.46 ± 1.66	0.430
	CPAP+LCKD	3.46 ± 2.66	2.76 ± 2.14	0.181
Cholesterol (mg/dL)	CPAP	196.1 ± 32.9	180.8 ± 33.0	0.153
	CPAP+LCKD	200.1 ± 30.1	180.4 ± 35.2	0.0183*
HDL (mg/dL)	CPAP	46.4 ± 10.3	47.3 ± 9.8	0.612
	CPAP+LCKD	48.3 ± 9.41	48.8 ± 10.4	0.910
LDL (mg/dL)	CPAP	128 ± 30.2	112.9 ± 34.9	0.139
	CPAP+LCKD	127.4 ± 26.8	107.1 ± 37.1	0.0198*
Triglycerides (mg/dL)	CPAP	151.6 ± 62.5	129.7 ± 62.2	0.0985
	CPAP+LCKD	191 ± 41.7	130 ± 79	<0.001*
Ketonemia (mmol/L)	CPAP	0.246 ± 0.32	0.240 ± 0.20	0.410
	CPAP+LCKD	0.299 ± 0.41	0.893 ± 1.22	0.0002*

Schiavo L. et al . Obesity Surgery, 2022



Schiavo L. et al. Obesity Surgery, 2022

Article

Safety and Effectiveness of a 4-Week Diet on Low-Carb Ready-to-Eat Ketogenic Products as Preoperative Care Treatment in Patients Scheduled for Metabolic and Bariatric Surgery

Biagio Santella [1,2], Monica Mingo [1], Alexander Papp [3], Mark Rice [4], Sonja Chiappetta [4], Pietro Calabrese [5], Fabrizia Calenda [5], Vincenzo Pilone [5] and Luigi Schiavo [1,2,*]

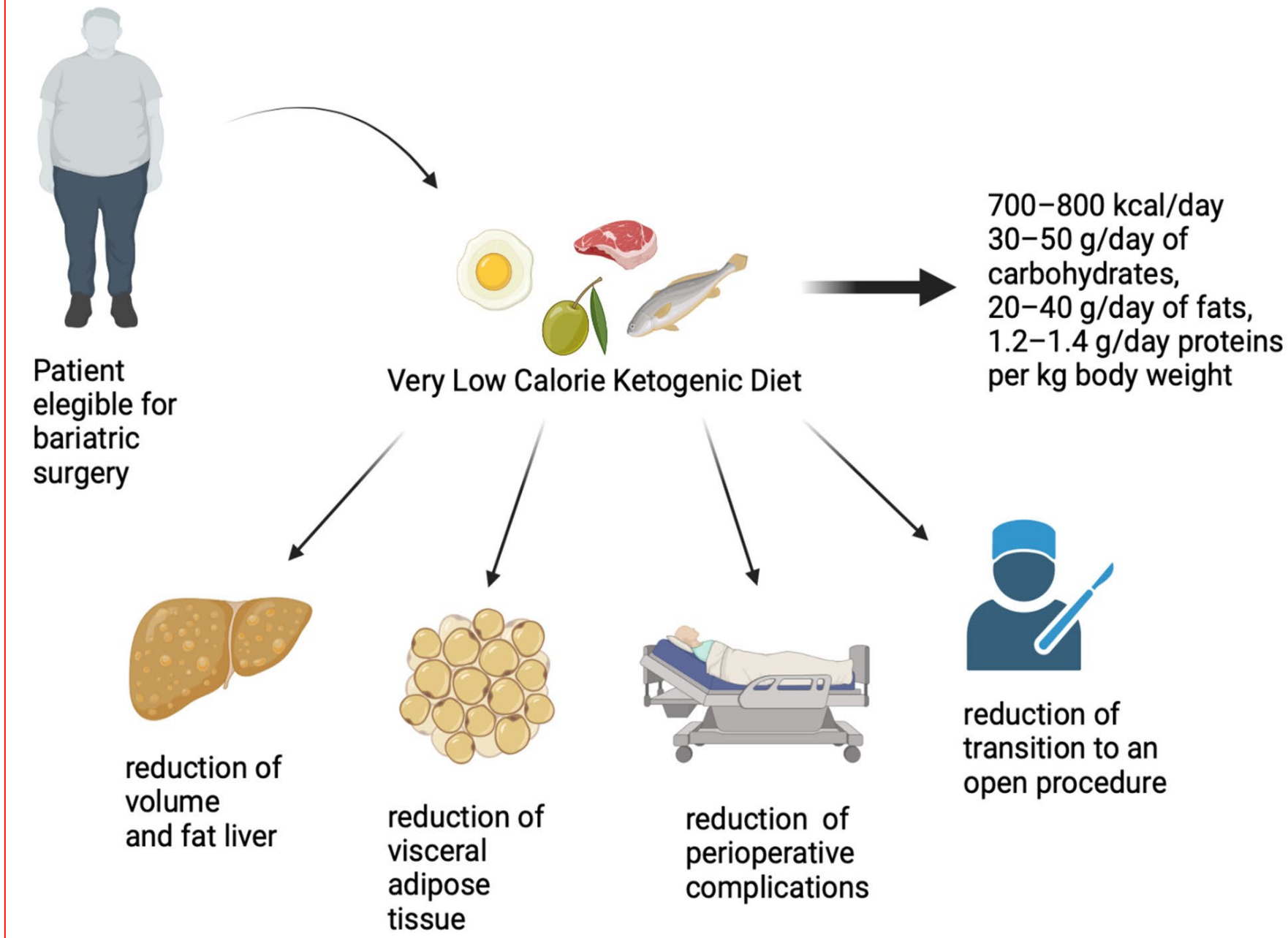
Abstract: Before metabolic and bariatric surgery (MBS), moderate weight loss and liver left late section (LLLS) volume reduction are desirable. Low-carb ketogenic diet-induced weight loss bef MBS has been shown to have beneficial effects on the reduction in body weight (BW) and LL However, the nutritional protocol of low-carb ketogenic diet may be hard to keep for prolong periods due to the lack of sweet taste. Furthermore, transitioning to a low-carb ketogenic diet c cause people to crave foods that are restricted in the ketogenic diet, such as cookies, bread, pasta, a bagels. Therefore, many ready-to-eat low-carb ketogenic products (RLCKP) that mimic carbohydra rich foods despite a low-carb composition have been provided to make it easier for the patients adopt a low-carb lifestyle. To date, there are no studies describing the dietary protocol for efficie and safe use of pre-operative RLCKP in terms of weight and LLLS volume reduction in patients w obesity scheduled for MBS. Therefore, the aim of this study was to assess the safety and effectiven of a 4-week diet using RLCKP in reducing BW and LLLS volume in patients with obesity schedul for MBS. Patients with obesity (n = 42) with a mean body mass index (BMI) of 42.4 ± 9.2 kg/ scheduled for MBS underwent a 4-week preoperative RLCKP diet intervention. Their weig LLLS volume, and biochemical and metabolic parameters were measured before and after the d Patient compliance was assessed by the presence of ketonuria and weight loss. Qualitative metho (5-point Likert questionnaire) were used to measure diet acceptability and side effects. All patie completed the study. We observed highly significant decreases in BW (−6.5%, $p < 0.001$), and LL volume (−22.3%, $p < 0.001$) and an amelioration of patient clinical status. All patients showe high frequency of acceptability and compliance in following the diet. No adverse side effects w reported. Based on our findings, we were able to support the hypothesis that a 4-week preoperati RLCKP diet is safe and effective in reducing BW, and LLLS volume in patients with obesity schedul for MBS.

Table 3. Total body weight, BMI, and LLLS volume at baseline and after a 4-week course of preoperative RLCKP diet.

Clinical Characteristics	Baseline Mean ± SD	Follow-Up Mean ± SD	Δ%	p
Patients (n)	42	42		
Total body weight (kg)	118.4 ± 29.3	110.7 ± 27.5	−6.5	<0.001
BMI (kg/m^2)	42.2 ± 9.2	38.6 ± 9.3	−8.6	<0.001
Lateral left liver section (cm^3)	635.1 ± 30.3	493.4 ± 41.3	−22.3	<0.001

BMI body mass index.

Santella B . et al . Nutrients, 2024



Barrea L. et al. Nutrients, 2023

PROTOCOLLO TRATTAMENTO

Fasi

◊ **Fase 1** : chetogenica durata 20 gg

VLCD e Very low carbo diet con proteine a colazione e cena + 1 pasto con alimenti naturali

◊ **Fase 2 a** : dissociata integrata durata 20 gg

Dissociata integrata ipocalorica con carboidrati a basso I.G. e integrazione proteica al mattino

◊ **Fase 2 b** : dissociata integrata ipocalorica con tutti i cibi e integrazione proteica al mattino

Protocollo VLCKD integrato con proteine da siero di latte pure

- Normo proteico (secondo formula di Lorenz, fabbisogno calcolato 1,3/1,4 gr di proteine pro chilo di peso ideale). Quota assunta con integratore in polvere 45 gr die (rapporto di efficienza proteica considerato 1:1) + alimenti proteici naturali a raggiungere il fabbisogno.
- Ipocalorico : Cal 600/800 die ca
- Ipolipidico: fonti di grassi alimenti consigliati e olio di oliva extravergine.
- Contenuto carboidrati molto basso.
- (Essendo low lipid la quota di zuccheri consentiti è molto bassa e la produzione di corpi chetonici spesso non elevata dipendendo quasi esclusivamente dall'attività di mobilitazione dei grassi corporei).
- Carboidrati : 30/35 gr comunque <50 g/day, <200kcal/day, 16% ca del fabbisogno calorico
- Proteine : > 90 gr/day (Integratore proteico + alimenti freschi) >350kcal/day, 44% del fabbisogno calorico
- Grassi : < 30 gr/day, <250 kcal/day. 40% del fabbisogno calorico

Integrazione consigliata di sali minerali ad alto dosaggio a protezione dell'equilibrio elettrolitico

Composizione bromatologica per bustina (dose giornaliera 2 bustine)

FOS 1800 mg

Potassio 495 mg (25%NRV*)

Calcio 400 mg (50% NRV*)

Magnesio 150 mg (40% NRV*)

Vitamina C 90 mg (112% NRV*)

Vitamina E 15 mg (125% NRV*)

Manganese 0,5 mg (25% NRV*)

Vitamina A 400 mcg (50% NRV*)

Selenio 27,5 mcg (50% NRV*)

Vitamina D3 2,5 mcg (50% NRV*)

Journal of
Clinical Medicine

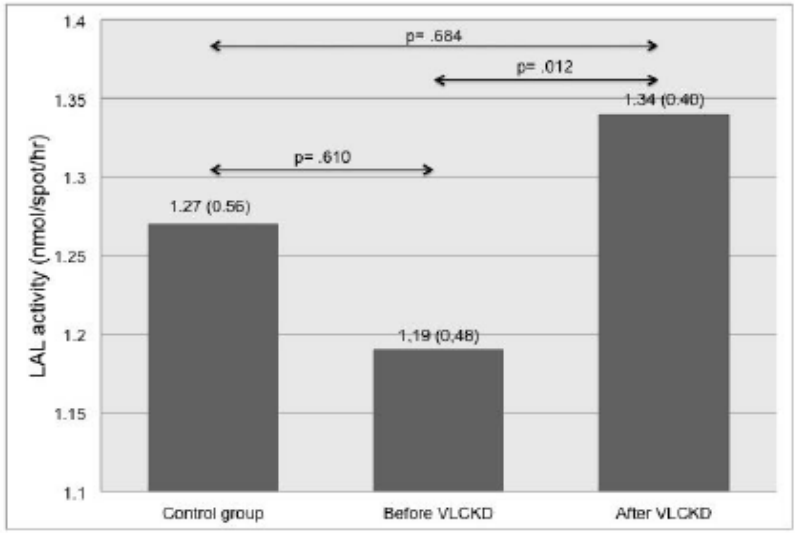
MDPI

Article

Lysosomal Acid Lipase as a Molecular Target of the Very Low Carbohydrate Ketogenic Diet in Morbidly Obese Patients: The Potential Effects on Liver Steatosis and Cardiovascular Risk Factors

Stefano Ministrini [1,*], Lucia Calzini [1], Elisa Nulli Migliola [1], Maria Anastasia Ricci [1], Anna Rita Roscini [1], Donatella Siepi [1], Giulia Tozzi [2], Giulia Daviddi [1], Eva-Edvige Martorelli [1], Maria Teresa Paganelli [3] and Graziana Lupattelli [1]

Ministrini S. et al. Journal of Clinical Medicine, 2019



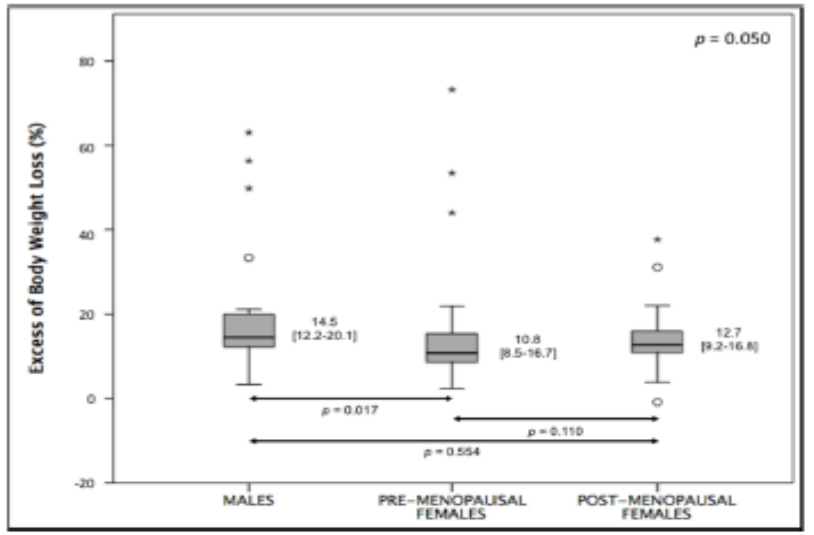
	Baseline (20 pts)	After VLCKD (20 pts)	*p*-Value
Weight, kg	120 ± 25	113 ± 23	0.001
Body mass index, kg/m^2	44 ± 8	41 ± 8	<0.001
Visceral fat area, cm^2	281 ± 76	251 ± 80	0.009
Flow-mediated dilation, %	13 ± 6	12 ± 5	0.711
LDL-cholesterol, mg/dL	112 ± 26	98 ± 22	0.002
Triglycerides, mg/dL	184 ± 120	136 ± 74	0.003
Insulin, IU/L	22.8 ± 22.4	14.4 ± 7.8	0.007
HOMA index	5.6 ± 6	3.2 ± 2	0.009
γGT, IU/L	41.2 ± 30	28.8 ± 15	0.008
Liver Steatosis			
No steatosis	0 (0%)	2 (10%)	0.046
Grade 1	3 (15%)	7 (35%)	
Grade 2	4 (20%)	3 (15%)	
Grade 3	13 (65%)	8 (40%)	

Article

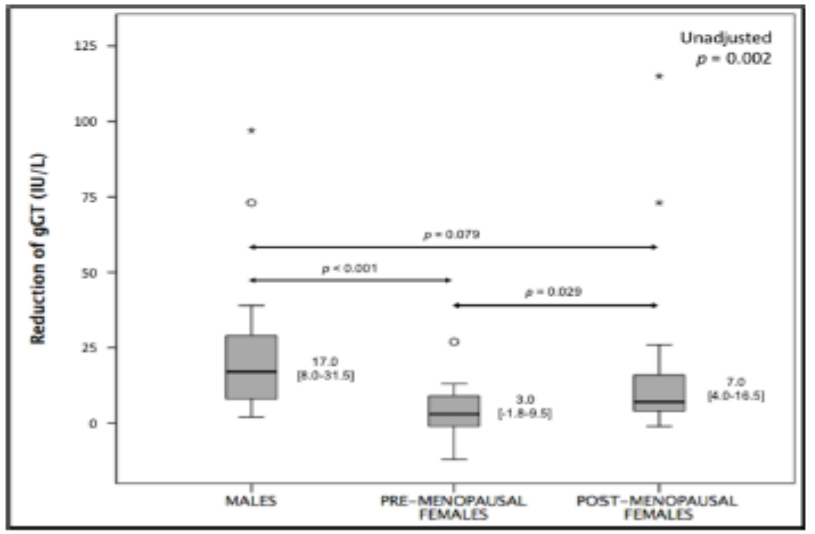
Very Low-Carbohydrate Ketogenic Diet for the Treatment of Severe Obesity and Associated Non-Alcoholic Fatty Liver Disease: The Role of Sex Differences

Marco D'Abbondanza [1,2], Stefano Ministrini [1,*], Giacomo Pucci [1,2], Elisa Nulli Migliola [1], Eva-Edvige Martorelli [1], Vito Gandolfo [1,2], Donatella Siepi [1], Graziana Lupattelli [1] and Gaetano Vaudo [1,2]

Abstract: Very low-carbohydrate ketogenic diets (VLCKDs) are an emerging nutritional treatment for severe obesity and are associated with a significant improvement in non-alcoholic fatty liver disease (NAFLD). Little is known about the effect of sex differences on weight loss induced by following a VLCKD. The aim of this study was to investigate the effects of sex differences on weight loss and NAFLD improvement in patients with severe obesity undergoing a VLCKD. Forty-two females and 28 males with severe obesity underwent a 25-day VLCKD. Anthropometric parameters, bioimpedentiometry, degree of liver steatosis measured by ultrasonography, liver function tests, and glucose homeostasis were measured before and after the VLCKD. Males experienced a significantly larger excess body weight loss (EBWL) and a greater reduction in γ-glutamyl transferase (γGT) than females. Dividing the female group by menopausal status, a significant difference between males and pre-menopausal females was found for both EBWL and γGT. No significant difference between groups was observed for improvement in the Edmonton stage or in the degree of steatosis. We conclude that the efficacy of following a VLCKD in severe obesity is affected by sex differences and, for females, by menopausal status. Males seem to experience larger benefits than females in terms of EBWL and NAFLD improvement. These differences are attenuated after menopause, probably because of changes in hormonal profile and body composition.



(a)



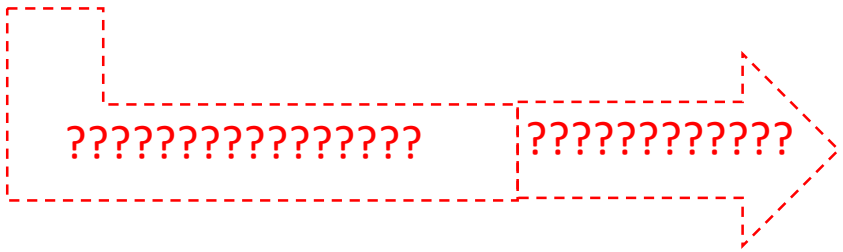
(b)

D'Abbondanza M. et al Nutrients, 2020

Predictors of weight loss in patients with obesity treated with a Very Low-Calorie Ketogenic Diet

Introduction: The Very Low-Calorie Ketogenic Diet (VLCKD) has emerged as a safe and effective intervention for the management of metabolic disease. Studies examining weight loss predictors are scarce and none has investigated such factors upon VLCKD treatment. Among the molecules involved in energy homeostasis and, more specifically, in metabolic changes induced by ketogenic diets, Fibroblast Growth Factor 21 (FGF21) is a hepatokine with physiology that is still unclear. .....

Discussion: VLCKD is a safe and effective treatment for obesity and obesity related metabolic derangements. Men with central obesity and lower circulating FGF21 may benefit more than others in terms of weight loss obtained following this diet. Further studies investigating whether this is specific to this diet or to any caloric restriction are warranted.



Ernesti I. et al. Frontiers in Nutrition, 2023

TABLE 1

Risk Factors for Weight Regain After Bariatric Surgery

- Unrealistic expectations of surgical outcomes ("magic bullet" theory)
- Lack of commitment to necessary lifestyle change: meal planning, food selection, physical activity, support groups
- Nonadherence to nutrition recommendations (protein, fluid, micronutrient supplementation)
- Sedentary lifestyle
- Lack of postoperative follow-up with MD and RD
- Uncontrolled or untreated behavioral health conditions, or drug/alcohol abuse
- Inadequate support or strong disapproval from person of significance regarding the choice to have surgery
- Maladaptive eating: mindless eating, soft food syndrome, grazing, skipping meals, night eating, and/or consistent dietary indiscretions

— SOURCE: SORENSEN KW, HERRINGTON H, KUSHNER RF. NUTRITION AND WEIGHT REGAIN IN THE BARIATRIC SURGICAL PATIENT. IN: KUSHNER RF, STILL CD, EDS. ***NUTRITION AND BARIATRIC SURGERY***. 1ST ED. BOCA RATON, FL: CRC PRESS; 2015:265-279.

EFFECTIVENESS AND SAFETY OF A VERY LOW-CALORIE KETOGENIC DIET ON WEIGHT REGAIN FOLLOWING BARIATRIC SURGERY

METHODS

11 participants who underwent Roux-en-Y gastric bypass (RYGB) with insufficient weight loss or weight regain.

They followed a commercial multidisciplinary weight loss program **(Pnk® method)** which consists of a VLCKD (600 – 800 kcal/d)

RESULTS

Variables	Mean	Minimum	Maximum	Standart Deviation	Wilcoxon's Test
Weight[1] (kg)	96.81	71.60	152.60	29.51	Z = -2.936 p-value = 0.003
Weight[2] (kg)	86.75	63.10	144.00	28.93	
BMI[1]	35.45	26.80	56.00	8.54	Z = -2.936 p-value = 0.0003
BMI[2]	31.88	24.20	54.00	8.86	
AC[1] (cm)	108.45	87.00	137.00	16.75	Z = -2.938 p-value = 0.003
AC[2] (cm)	98.45	80.00	133.00	17.87	
A1c[1]	5.35	4.80	6.30	0.48	Z = -2.965 p-value = 0.0003
A1c[2]	5.04	4.50	6.00	0.40	

BMI (Body Mass Index); AC (Abdominal Circumference); A1c (Glycated Hemoglobin).
1 Pre-ketosis measurement.
2 Post-ketosis measurement.

Key finding 1: A significant reduction was in weight, BMI, AC and A1C pos ketosis observed (p-value < 0.05).

Key finding 2: Uric acid, transaminases, urea, and creatinine values did not show differences between pre and post ketosis.

Key finding 3: All of participants lost more than 5% of their weight and 6 of them more than 10%.

CONCLUSIONS

This study has showed that ketogenic diet can be recommended as an effective and safe treatment for patients who progressed with insufficient weight loss or regain after bariatric surgery.

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OBESITY SURGERY
The Journal of Metabolic Surgery and Allied Care

Correa L. et al. Obesity Surgery, 2021

Conclusioni

- La chirurgia bariatrica è il trattamento più efficace per la riduzione del peso ed il carico di comorbidità nel paziente con grave obesità. Nonostante il basso tasso di mortalità complessiva, sono comuni le complicanze intra e post-operatorie .

- Un percorso VLCKD/ LCKD, comporta una considerevole perdita di peso, una riduzione del volume epatico ed una riduzione del grasso viscerale che si traduce in una riduzione del rischio intra e post-operatorio, delle complicanze post-chirurgiche e dei tempi di degenza.

- Una riduzione del peso mediante dieta chetogenica, combinata alla CPAP, nei soggetti gravemente obesi in attesa di intervento e con OSAS, pur non variando significativamente il punteggio AHI ha comunque un effetto benefico nel ridurre la dispnea e lo stato infiammatorio del soggetto, a beneficio del decorso intra e post-operatorio.

- Sebbene la letteratura corrente supporti l'efficacia e la sicurezza del trattamento VLCKD nei pazienti obesi nella fase pre-operatoria, poche, ma nel contempo «promettenti» sono le indicazioni all'utilizzo dello stesso in quei soggetti che, con la chirurgia, non hanno raggiunto i risultati sperati e/o hanno recuperato peso nel tempo.

- La formulazione di protocolli dietetici ben definiti e soprattutto un lungo periodo di follow-up ci consentiranno di capire gli effetti a lungo termine della perdita di peso pre-operatoria.

SICOBEVENTI

PRESIDENTE ONORARIO
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PERUGIA, 9 GIUGNO 2025

ADVANCED BARIATRIC SURGERY

CHIRURGIA BARIATRICA ASSOCIATA AD ALTRI INTERVENTI E CHIRURGIA REVISIONALE

Grazie