

Short Communication

Mediterranean Diet Still Holds a Place in Obesity Treatment Despite the Considerable Effectiveness of the Very Low-Calorie Ketogenic Diet: A Short Communication

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E-mail: kulvinder.dr@gmail.com**Article information****Received:** February 3rd, 2023; **Revised:** March 28th, 2023; **Accepted:** May 1st, 2023; **Published:** May 10th, 2023**Cite this article**Kaur KK, Allahbadia GN, Singh M. Mediterranean diet still holds a place in obesity treatment despite the considerable effectiveness of the very low-calorie ketogenic diet: A short communication. *Obes Res Open J.* 2023; 10(1): 1-5. doi: [10.17140/OROJ-10-150](https://doi.org/10.17140/OROJ-10-150)**ABSTRACT**

There has been an escalating incidence of obesity along with type 2 diabetes mellitus (T2DM), as well as other co-morbidities so much so that the term diabetes had to be coined for this worldwide epidemic. Different attempts have been done to unravel the etiology of this ever-escalating problem, however, there has been a failure to control it. All the newer combinations like Qsymia (topiramate, phentermine), Contrive (naltrexone: bupropion), liraglutide, etc., have been unsuccessful with either cost prohibitions or side effects/contraindications. Thus, attention had shifted to dietary therapies like high protein diet, the mediterranean diet (MD), and Probiotic therapy. However, none has ensured the sustenance of weight reduction. In 2018, we reviewed how the very-low-calorie ketogenic diet (VLCKD) might be successful not only in obesity therapy but also in correlated endocrine dysfunction. Recently, there has been a lot of resurgence of the use of VLCKD. The authors performed an extensive search on various platforms like PubMed; Google scholar; Web of Science; Embase; Cochrane review library utilizing the MeSH terms; “Obesity/Overweight”; “Various diets MD”; “VLCKD to assess the efficacy of which diet is better” from 1995 till date. Nevertheless, it has been seen that the efficacy of this is not seen uniformly. Thus, the group of Muscogiuri G recently observed that compliance with MD acts in the form of the anticipation of the effectiveness of VLCKD, thus the role of MD in obesity persists because of anti-inflammatory along with antioxidant actions of MD that ensures good ketosis generation.

Keywords

Obesity; Mediterranean diet (MD); Very low-calorie ketogenic diet (VLCKD), Type 2 diabetes mellitus (T2DM).

INTRODUCTION

Obese and is seen as an escalating condition with unclear pathophysiology. The World Health Organization (WHO) recently showed that very-low-calorie ketogenic diet (VLCKD) is trending upward and that current methods of combating it are failing.² One (1) in 3 children in Europe (29% of boys and 27% of girls) and 59% of adults are overweight or already obese.² In particular, by 2016, age-standardized overweight/obesity prevalence was 58.5% and 19%, respectively, among people in Italy.³ It's interesting to note that inflammation coexists with obesity and is influenced by the excessive production of reactive oxygen species (ROS).^{4,6} Furthermore, many definitions of co-morbidities, including chronic conditions like, sleep apnea syndrome, type 2 diabetes mellitus

(T2DM), hypertension, dyslipidemia, polycystic ovarian syndrome (PCOS), various malignancies, etc.^{7,8} Although losing weight is no joke, the main goal is to achieve decreased energy consumption while increasing energy expenditure.⁹⁻¹¹ Various methods of weight loss includes anti-obesity drugs, anti-obesity bariatric surgery, and various dietary adjustments.¹²⁻¹⁴ Any new anti-obesity medications with advantageous features are prohibited due to their economic unviability, contraindications, and possible adverse side effects.^{13,15} Although bariatric surgery typically reduces weight and helps with T2DM remission in addition to metabolic syndrome (MetS), there are several complications, so the use of this procedure is possible in selected patients who have severe obesity and no medical conditions that would preclude it.^{16,17} High protein diets are one of the various nutritional treatments for treating obesity.¹⁸

Mediterranean Diet

A healthy dietary style that includes a variety of plant foods is the mediterranean diet (MD).¹⁹ Foods like extra virgin olive oil (EVOO), fruits, vegetables, legumes, nuts, red wines, and whole grain cereals make up the MD. Less saturated fat, more mono- and polyunsaturated fats, bioactive compounds including polyphenols, and omega-3 fatty acids with antioxidant and anti-inflammatory qualities are its main characteristics. Given its anti-inflammatory and antioxidant properties as well as some inherent traits (high consumption of carbohydrates, fat, monounsaturated fatty acids, and fiber, are among other things) MD may be a good nutritional option for those looking to lose weight.¹⁹ These beneficial MD effects are secondary to many foods, anti-inflammatory and antioxidant effects.²⁰ This MD is thought to be the best dietary model for lowering cardiovascular risk because it has beneficial biological actions related to anti-inflammatory, anti-hypertensive, anti-diabetic, and anti-atherogenic actions that are implicated in the mode of action, in addition to trials correlated with intervention.²¹ Aside from the decline in anatomical, allergy, and asthmatic disorders, MD is also reportedly linked to a lower incidence of certain cancers.^{4,20,22-24} Additionally, MD has been linked to the interaction of pollutants and the maintenance of environmental factors, both of which reduce the incidence of cardiovascular disease (CVD) and promote overall health.²⁵

The ability of MD to positively modulate the gut microbiota (GM) makeup aside from variation has also been proven,²⁶ particularly in patients with overweight or obesity.²⁷

In the setting of T2DM, MD is beneficial in preventing the spread of T2DM due to its anti-inflammatory and antioxidant properties as well as good changes in GM.²⁸

Ketogenic Diet

Nevertheless, obesity issues persist despite the MD's acknowledged beneficial impacts on human health. Regarding this, people with obesity who did not lose weight using nutrition-related macronutrient balance treatments may benefit from the VLCKD, a previously recognized approach.^{29,30} This diet is comprised of carbohydrate-restricted (mostly <30 g daily) along with, comparatively escalated protein (around 43% of full energy) as well as fat around 44% of full energy). The total daily energy usage was quite low (about 800 Kcal). By definition, a ketogenic diet (KD) is a diet that can cause ketosis. This refers to the presence of physiologically substantial blood ketone body amounts (equal to 4 mmol/L) due to the diet's impact on the liver's overproduction of ketone bodies (KB).³¹ According to the most recent example, it is effective in treating obesity, dyslipidemia, and cardiovascular risk factors, along with lower calorie intake, decreased insulin levels, increased glucagon levels, and particularly the production of ketone bodies, which have an impact in addition to other beneficial actions with more rapid weight loss compared to other dietary manipulation.^{30,32}

It is possible to enter ketosis by fasting for an extended time or by drastically reducing daily carbohydrate intake (50 g). In

such circumstances, KBs begin to be used as energy for the central nervous system (CNS).³³ This therapeutic feature of KD has been known for almost a century, dating back to the possibility of using it for effective epilepsy management.³⁴ More recently, it has been shown that KD may also be helpful for neurodegenerative and mental illnesses.³⁵

Subsequently, since the 1960s utilization of KD has been facilitating weight reduction that assumed greater fame in the 1970s and 1980s as a protein-sparing modification of fasting (PSMF) whose introduction was done by Blackburn³⁶? PSMF is a project introduced by Blackburn. Utilizing VLCKD is to achieve speedy weight loss.³⁶

The oxidation of fats stored as the body's main energy source is made easier as a result of the increased caloric deficit.³⁷ Additionally, ketosis has the added benefit of causing anorexia through the actions of ketone bodies.³⁸ However, the effects of VLCKD on lean mass are not significantly different from those we get from other weight loss methods.³⁹

Different scientific societies have pointed to the safety of VLCKD regarding the management of obesity, with or without T2DM, pointing out how this diet is correct in controlling metabolic paradigm in an akin or occasionally even more advantageous in comparison to MD^{32,39} as well as have given guidelines with indications and contraindications. Despite some confusion among researchers still being present.³²

The actions of KD on GM have primarily been studied in animal models or cases of humans involving neurological and psychiatric illnesses, as well as infrequently in obesity and diabetes.^{40,41}

COMPARISON BETWEEN MD AND VLCKD

A large nutritional intervention has been proposed for MD, to put it briefly. Its characteristics include increasing consumption of fruits, vegetables, nuts, cereals, whole grains, and EVOO while limiting the intake of sweets, red meat, and dairy products. Moderate consumption of fish and poultry is also one of its characteristics. MD is the healthiest dietary pattern now available to combat obesity and avoid some non-communicable diseases, including type 2 diabetes (T2D) and cardiovascular disease (CVD). The beneficial effects of MD on decreasing central adiposity and visceral fat may be attributed to its high-levels of polyunsaturated fatty acids (PUFA) and monounsaturated fatty acids (MUFA) and lower intake of saturated fatty acids (SFA).¹⁹ It has long been known that SFA makes up the majority of visceral adipose tissue. Visceral adipose tissue is known to contain mostly SFA, whereas deposits of PUFA and MUFA are found in subcutaneous fat.¹⁹ In line with this hypothesis, a short crossover study in patients with obesity (n=11), individuals with insulin resistance (IR) illustrated that an isocaloric MD rich in EVOO avoided central body fat accrual when contrasted to a low-fat diet without effect on body weight. Reduction in visceral adipose tissue (VAT) has been reported in two interventional trials of MD after 2-months. Conversely, a small randomized clinical trial (RCT) of *ad libitum* MD (n=35) compared to a low-fat

diet (n=31) for 6-months demonstrated that the former was associated with reduced subcutaneous adipose tissue but not VAT or other body constituent paradigms in patients with overweight/obesity post-coronary event.¹⁹ However, the participants with more sustained adherence to MD had significantly lower waist circumference (WC) (-2.81 cm, $p=0.01$). No change in body weight, and a trend for reduction in total body fat, was seen despite the tendency for increased total energy intake in the MD group. An intervention with calorie-restricted protein-enriched MD of 8-weeks' duration has been shown to result in a significant reduction in weight (-16.7%), visceral fat (-27.4%), and fat mass (-28.1%) with preservation of fat-free mass (FFM) in men with obesity (n=37) awaiting laparoscopic sleeve gastrectomy. Another short-intervention study of 6-weeks' duration demonstrated that hypocaloric MD was superior in reducing body fat mass and preserving FFM compared to high-protein diets in young, sedentary individuals.¹⁹ Preservation of FFM may be of particular importance in preserving short- and long-term benefits of weight loss given that FFM has been associated with decreased basal metabolic rate and the risk of developing sarcopenic obesity.¹⁹

According to an excellent systematic review and meta-analysis the VLCKD was summarized to be characterized by a low carbohydrate quantity (<50 g/day), 1-1.5 g of protein/kg of ideal body weight, 15-30 g of fat/day, and daily ingestion of about 500-800 calories. Significant weight loss in the short, intermediate, and long-term and improvement in body constituent paradigms along with glycemic as well as lipid profiles. Second, in contrast to other weight loss interventions of the akin periods, the VLCKD demonstrated a main action on a decrease of body weight, fat mass, waist circumference, and total cholesterol in addition to hypertriglyceridemia along with leading to enhancement of IR. Third, despite the VLCKD further resulted in a significant reduction of glycemia, hemoglobin A1c (HbA1c), and low-density lipoprotein cholesterol (LDL-C), these alterations were akin to those derived with other weight loss interventions, the VLCKD can be believed to be safe nutritional strategies under a health professional's supervision given the most common inimical actions are commonly clinically mild and easy to manage and recovery is usually spontaneous.³⁸

Hence VLCKD's beneficial actions over MD are VLCKD by itself is a low-calorie diet whereas one has to ensure restriction of calories in MD and not allow ad libitum and exercise has to be supplemented to produce weight loss. In VLCKD there is muscle mass preservation whereas in MD this has to be ensured by calorie-restricted MD. Better long-lasting significant weight loss in the short, intermediate, and long-term and improvement in body constituent paradigms along with glycemic improvement as well as lipid profiles. Second, in contrast to other weight loss interventions of the akin periods, the VLCKD demonstrated a main action on a decrease of body weight, fat mass, and waist circumference. The significant reduction of glycemia, HbA1c, and LDL cholesterol, were *akin* in both. Hence, VLCKD is superior.

Nevertheless, the acknowledged advantageous actions of the MD regarding human health, obesity problems keep continuing. Regarding this obesity subjects who did not attain weight reduction with macronutrient balance strategies with regards to

nutrition might be helped by a prior acknowledged strategy with regards to nutrition which is the VLCKD.^{29,30} This diet is comprised of carbohydrate-restricted (mostly <30 g daily) along with, comparatively escalated protein (around 43% of full energy) as well as fat (around 44% of full energy). The full energy consumption/day was very less (approximately 800 KCal daily). The most recent illustration is its effectiveness regarding obesity treatment, that of dyslipidemia along with cardiovascular risk factors along with lesser calorie consumption, reduction in insulin quantities, escalated glucagon quantities, in particular the generation of ketone bodies that have an extra impact to other advantageous actions with more rapid weight reduction in contrast to other dietary manipulation.^{29,30} Another advantage is the compliance to this diet, a difficulty commonly faced with other dietary manipulation, with the added advantage of anorexia-inducing actions of ketone bodies. Lastly, the comparative sustenance of protein mass in contrast to starvation is another benefit of this.³⁸ Despite variable studies that have emphasized the effectiveness of VLCKD for obesity treatment, all subjects who start VLCKD do not have weight reduction along with alterations in body makeup. Nevertheless, there might be the existence of a spectrum regarding the effectiveness, that is secondary to the action regarding ketosis.

For evaluation of various pathophysiological modes utilized by MD along with VLCKD, it was posited by the group of Muscogiuri⁴² to gain insight, that the constancy of use/sticking to MD might be the deciding factor regarding the effectiveness of VLCKD. Thus, they recruited 138 women (age 38.84 ± 14.37 -years; BMI 35.75 ± 5.18 kg/m²) along with evaluated their anthropometric parameters, body makeup as well as compliance to MD with the *prevención con dieta mediterránea* (PREDIMED) questionnaire at the baseline. A repeat of the estimation of anthropometric parameters, as well as body makeup was carried out by the finishing of VLCKD. At the finishing of VLCKD the women having greater compliance to MD attained the maximum favorable outcomes obtained regarding weight reduction along with alterations in the body makeup. In particular, the women who were over the median of fat mass (FM%) and decrease possessed the most efficacious MD pattern, possessing the properties of greater ingestion of EVOO, fruits along with red wines possessed the maximum compliance to MD in contrast to women who were under this median. In a multiple regression analysis, the PREDIMED score was the major anticipator of the proportion of FM% decrease score coming first, followed by fruits, EVOO, as well as wine glasses in anticipating a decrease of FM. Having a PREDIMED score >5 might work in the form of a threshold/cut-off point regarding finding the patients having a greater probability of attaining decrease FM when finishing of VLCKD time reached.⁴²

CONCLUSION

It was discovered through extensive research into the etiopathogenesis of obesity and the development of anti-obesity medications. In the case of morbid obesity, nothing is effective besides bariatric surgery in particular. The VLCKD has increased recently concerning the treatment of obesity, almost ensuring the discarding of the formerly utilized healthy MD from decades earlier. Despite this, the Muscogiuri group took into account the various

pathophysiological mechanisms of the two diets when deciding which patients might benefit from VLCKD. Therefore, it has been demonstrated by the investigations of the Muscogiuri group that there may still be a benefit to using MD in anticipation of the effectiveness of VLCKD.

Consequently, it was determined that improved adherence to MD was what caused the increased effectiveness of VLCKD. This may be secondary to MD's anti-inflammatory and antioxidant effects, both of which have the potential to create a metabolic environment that is favorable for the beginning of effective ketosis. Therefore, using MD before VLCKD helps the procedure work better.⁴²

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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