The Very Low Carbohydrate Low Saturated Fat Diet - Overweight and Obese Individuals with Type 2 Diabetes., Tay etal

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Undertook a 24 week randomised trial to comprehensively compared the effects of a very low carbohydrate, high unsaturated/ low saturated fat diet (LC) to a high unrefined carbohydrate, low fat diet (HC) on glycemic control and cardiovascular risk factors in type 2 diabetes (T2DM) (1).

The food profiles for each dietary intervention were as follows:

LC diet - Energy 1425 kcal	HC diet - Energy 1429 kcal
30g high fibre, low GI cereal*	40 g high fibre, low GI cereal*
1 crispbread (e.g. Ryvita)*	5 crispbread (e.g. Ryvita)*
250 g lean chicken, pork, fish, red meat (3-4 times/week)	½ cup cooked pasta/rice/potato*
40 g almonds and 20 g pecans*	2 slices wholegrain bread (70g)
3 cups low starch vegetables (exclude potato/sweet potato/corn	80 g lean chicken, pork, red meat (4 times/week)*
200 mL skim (>1% fat) milk	80 g fish (2 times/week)*
100 g diet yoghurt	80 g legumes (1 time/week)*
20 g (1 slice) regular cheese	3 cups vegetables
30 g (6 tsp) margarine/oil of monounsaturated variety (e.g., canola oil, margarine)	400g fruit
	250mL reduced (1-2%) fat milk
	150 g reduced fat yoghurt
	20 g (1 slice) regular cheese
	25 g (5 tsp) margarine/oil of monounsaturated variety (e.g., canola oil/margarine)

Glycemic index. *Key foods supplied, representing – 30% of total energy intake.

The prescription of each of the LC and HC diets were energy matched to allow comparable weight loss between groups, removing the potential confounders, enabling the differences between groups to be attributed to the differences in macronutrient profiles.

The diets were individually tailored to produce a moderate energy restriction of between 200 – 1000kcal per day, with the introduction of specific foods. The macronutrient profiles were as follows:

Diet	Carbohydrate	Protein	Fat	Saturated
LC	14% (<50g)	28%	58% 35% MUFA, 13% PUFA	<10%
HC	53%	17%	<30% MUFA 15% PUFA 9%	<10%

Individuals in each diet grouping undertook, 60 minute structured exercise classes on three consecutive days per week, incorporating moderate intensity aerobic/resistance exercises, consistent with the diabetes management guidelines.

The study assessed the primary outcome of HbA1c and secondary outcomes included Glycemic Variability (GV), antiglycemic medication changes, blood lipids and blood pressure. Outcomes were assessed at zero and 24 weeks.

The research revealed the following:

1. That diet composition significantly affected the TG level with a five fold greater reduction with the LC diet.
2. For the range of available baseline HDL-C values, greater increases occurred with the LC diet for participants with a baseline HDL-C < 1.3mmol/L, with no difference between groups for participants with a baseline HDL-C >1.3 mmol/L
3. The diet effects on HbA1c were dependent on initial HbA1c levels, where LC diet reduced HbA1c to a greater extent among participants with baseline HbA1c > 7.8mmol/L, with no diet effect in participants with baseline HbA1c ≤7.8.
4. The LC diet had greatest reduction in blood glucose range among participants with a baseline meant glucose > 8.6mmol/L, maximum blood glucose >13.2 mmol/L, and AUCtotal per min >18.0mmol/L

5. β regression analysis demonstrated that participants on the LC diet were 85% more likely ranges and 56% less likely to spend a higher proportion of time in euglycemic and hyperglycemic range
6. The LC diet group were 16% less likely to spend time in the hypoglycemic range

Conclusion

Both the LC and HC energy reduced low saturated fat dietary regimen produced substantial improvements in glycemic control and several cardiometabolic markers in obese adults with T2DM.

However the greatest improvements were seen in the LC diet group, with respect to the following:

1. Glycemic control
2. Blood glucose profile
3. Reduction in diabetic medication requirement in comparison to HC group
4. More favourable CVD profile with greater increases in HDL-C and reductions in TG with comparable reductions in LDL-C

These results were more evident where participant had greater metabolic derangements.

These results suggest that LC with a high unsaturated fat, low saturated fat content can improve primary clinical diabetic targets beyond conventional lifestyle management strategies and weight loss.

It is known that a reduction in HbA1c -1% is estimated to reduce the risk of:

- ✓ Diabetes related death by 21%
- ✓ Myocardial Infarction by 14%
- ✓ Microvascular complications by 37%

The Hba1c – reduction of 0.7% identified in this study could translate to a significant further reduction in diabetes complication risk.

The LC diet also showed a greater efficacy in improving the Glycemic Variability (GV) and reduced both major and minor BG excursion, with a greater attenuation within and between days. This resulted in a greater reduction in antiglycemic medication, representing a significant cost saving. For example in the US, 30% of the estimated $245 billion diabetes related costs are attributable to medication costs.

Researchers have highlighted that the effectiveness of a nutritional therapy in diabetes management to reduce complications, necessitates the long term adherence to a dietary strategy which is notoriously difficult.