

No Change in Muscle or Liver Fat Content in Adults After 6 Months of Daily Consumption of Sugar Sweetened or Diet Beverages

Theodore J Angelopoulos², Joshua Lowndes¹, James Rippe¹

1 - Rippe Lifestyle Institute, Celebration, FL, 2 – Emory & Henry College, Emory, VA

Introduction

- Dietary sugars, and fructose in particular, have been suggested as potential contributors to the western world's growing obesity problem and associated conditions of diabetes (DM) and nonalcoholic fatty liver disease (NAFLD).
- Sugar Sweetened Beverages (SSB) are the primary source of sugar and fructose in the American diet and as such they have received intense focus.
- Some epidemiological data support the unique role of SSB consumption in the development of obesity, DM and NAFLD but there is little longitudinal, interventional data that support this.
- Expansion of fat stores in non-adipocytes has been shown to be an important link between these interrelated conditions and the development of cardiometabolic disorders, and so the purpose of this study is to investigate the effects of six-months of daily consumption of SSBs on ectopic fat storage.

Methods

- This was a 6 month study that included sixty-six apparently healthy normal weight or overweight, normotensive and normoglycemic individuals
 - Mean age 32.8 ± 8.6 years
- All participants were randomly assigned to one of three groups:
 - 1) SSB (n=20)
 - 2) diet beverage (n=20)
 - 3) water (n=26)
- Participants followed the ADA exchange diet daily for 6 months and incorporated 2 servings a day (average American level of consumption for SSB) of the required beverages.
- Compliance with the diet was initially checked weekly and gradually performed less frequently as the participant became more comfortable with the requirements.
- Before and after the intervention all participants underwent MRI testing of the thigh and abdomen.
 - Fat content of the vastus lateralis and gluteus maximum muscles was determined via signal attenuation
 - liver fat was measured using MR Spectroscopy.
- Data were analyzed using Analysis of Variance with Repeated Measures.
- Statistical analysis was performed using SPSS V 18.0.

Results

Change in Weight and BMI

		SSB	Diet	Water	All	Time	Interaction
Weight (lbs)	Pre	163.3 ± 26.1	163.7 ± 22.9	157.5 ± 23.5	161.0 ± 24.0	0.075	0.899
	Post	164.6 ± 26.9	164.4 ± 21.5	158.3 ± 23.6	162.0 ± 23.9		
BMI	Pre	25.7 ± 2.4	24.8 ± 2.2	25.2 ± 2.5	25.2 ± 2.4	0.064	0.930
	Post	25.9 ± 2.5	24.9 ± 2.1	25.3 ± 2.5	25.4 ± 2.4		

Change in Non-Adipose Fat Stores

		SSB	Diet	Water	All	Time	Interaction
Liver (%)	Pre	2.5 ± 2.1	2.7 ± 1.8	2.7 ± 1.9	2.6 ± 1.9	0.395	0.626
	Post	2.7 ± 2.7	2.8 ± 2.4	2.6 ± 1.8	2.7 ± 2.6		
Vastus Lateralis (g/dl)	Pre	3.2 ± 1.0	3.4 ± 0.9	3.4 ± 0.9	3.4 ± 0.9	0.203	0.096
	Post	3.4 ± 1.0	3.0 ± 0.9	3.3 ± 0.8	3.2 ± 0.9		
Gluteus Maximus (g/dl)	Pre	4.3 ± 1.5	4.6 ± 1.7	4.4 ± 1.3	4.4 ± 1.4	0.868	0.334
	Post	4.5 ± 1.4	4.3 ± 1.4	4.4 ± 0.9	4.4 ± 1.2		

Discussion & Conclusion

- These data suggest that in the context of weight maintenance, average consumption of SSBs does not promote storage of fat in organs shown to link obesity, DM and NAFLD.