

SUN-663: Dietary Coconut Oil Mitigates Features of Metabolic Syndrome in Obese Females

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Forty percent of American women are obese and at risk for metabolic syndrome. Coconut oil alters circulating lipid levels and improves glucose homeostasis in lean individuals, yet, whether it can exert these same beneficial effects on cardiometabolic health in obese individuals is unknown. We hypothesized that female pigs fed a high fat diet with 5% coconut oil would have improvements in features of metabolic syndrome (i.e., dyslipidemia) compared to female mini-pigs fed a high fat diet with 5% lard. We fed female pigs 2200 kcal of a control (n=6), 5000 kcal of a lard high fat (WSD; n=5), or 5000 kcal of a coconut oil high fat (COC; n=6) diet for a total of 9 estrous cycles (~ 7.5 months). Fasting blood was collected at the 1st, 7th (C 7), and 9th (C 9) estrous cycle. After C 7, an intravenous glucose tolerance test (IVGTT) was performed. Weights and morphometric measurements were taken weekly. Tissue was collected for histology at C 9. WSD females (15.14 ± 1.85 mg/dL) had a greater increase in fasting glucose as compared to COC (3.51 ± 4.31 mg/dL) and C females (0.45 ± 3.32 mg/dL; $p < 0.05$). COC females tended to be more glucose tolerant ($p = 0.07$) and had lower serum insulin concentrations in response to a glucose bolus ($p < 0.001$) than WSD females. COC (82.6 ± 1.1 kg) and WSD females (85.4 ± 1.0 kg) weighed more (C: 61.9 ± 1.1 kg; $p < 0.0001$) and had larger abdominal circumferences (COC: 122.4 ± 0.8 cm; WSD: 117.4 ± 1.0 cm) than control females (102.6 ± 1.0 cm; $p < 0.0001$). WSD females were the most dyslipidemic, with the greatest increase in triglycerides (C: 0.33 ± 1.5 mg/dL; COC: 7.71 ± 3.0 mg/dL; WSD: 17.25 ± 3.0 mg/dL; $p = 0.03$) and HDL:cholesterol (C: 3.44 ± 0.22 ; COC: 5.00 ± 0.36 ; WSD: 6.00 ± 0.42 ; $p = 0.05$) as compared control and COC females. COC females had increased plasma docosahexaenoic acid (C: -0.128 ± 0.291 ; COC: 0.262 ± 0.260 ; WSD: -0.732 ± 0.274 ; $p < 0.01$) and decreased arachidonic acid (C: 2.418 ± 0.744 ; COC: -4.561 ± 0.666 ; WSD: -2.068 ± 0.702 ; $p < 0.01$). COC females (131.26 ± 10.0 μ m) had a decreased average omental adipocyte diameter as compared to WSD females (160.06 ± 10.31 μ m; $p = 0.05$). COC females (7.3 ± 0.80 %) had less hepatic lipid accumulation as measured by oil red o stain than WSD females (9.2 ± 1.1 %; $p = 0.05$). These data demonstrate that small amounts of dietary coconut oil, even as a part of a high fat diet, can mitigate features of metabolic syndrome and decrease hepatic and visceral adipose tissue lipid accumulation in obese females.