

ABSTRACT

CHOLINE AND PHOSPHATIDYLCHOLINE SUPPLEMENTATION: THE EFFECTS ON PLASMA LIPID PROFILE AND HOMOCYSTEINE MODULATED GLUCOSE RESPONSE

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An elevation in plasma homocysteine concentration is characteristic in the pathogenesis of various diseased states, and emerging evidence suggests that it may play a critical role in impaired insulin secretion. Choline, upon conversion to betaine, plays a major role in homocysteine remethylation. The study aims to assess the effects of acute methionine load induced hyperhomocysteinemia on the normal response to an oral glucose challenge and to determine whether choline or phosphatidylcholine supplementation provides any protective benefits. The study also aims to assess whether supplementation with these compounds has any negative impact on plasma lipids. Male Sprague-Dawley rats were divided into groups for control (corn oil, n=4; water, n= 4), choline chloride 60 mg/kg body weight (BW) (n=5) and 90 mg/kg BW (n=5) and phosphatidylcholine supplementation, 435 mg/kg BW (n=4), by oral gavage 5 days weekly over a 3 week period. Animals were fed a standard pellet diet and tap water *ad libitum*. Fasting blood glucose concentration was unaffected by treatment with either choline or phosphatidylcholine. OGTT performed in the absence and presence of

induced acute hyperhomocysteinemia revealed a prolonged elevation in blood glucose levels for control groups at 120 minutes after methionine loading compared with results seen prior to acute methionine loading ($P < 0.001$). Additionally, supplementation with corn oil showed impaired glucose metabolism in an OGTT at 60 ($p < 0.05$) and 90 ($p < 0.001$) minutes post-methionine load. Choline and phosphatidylcholine supplementation preserved the normal response ($P < 0.001$) to an oral glucose load following methionine administration. Insulin at 120 minutes post-glucose/methionine load was significantly higher in phosphatidylcholine supplemented rats when compared with fasted control rats ($P < 0.001$), thus suggesting that the protective benefit of these supplements is associated with maintaining glucose stimulated insulin release. Plasma lipids were also assayed at 120 minutes post-glucose/methionine loading and were unaffected by supplementation in both choline and phosphatidylcholine groups. These results suggest that supplemental choline or phosphatidylcholine may offer protection from the impaired insulin secretion that can occur with acute hyperhomocysteinemia and may prove more beneficial than therapy with other choline containing compounds.

Keywords: Annalee N. Lopez, choline, phosphatidylcholine, OGTT, methionine loading, homocysteine, insulin secretion, glucose metabolism, plasma lipids.