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RE: Speculation on the Potential Use of Cassia Cinnamon Supplementation to Improve Insulin Sensitivity in Sleep Deprivation


Decades of research show that people are sleeping less worldwide, mirroring the growth of obesity and type 2 diabetes. In fact, research shows that shortened sleep duration is associated with obesity and diabetes. Chronic sleep loss induces insulin resistance, which is an early symptom of the pathogenesis of type 2 diabetes. Insulin resistance occurs when adequate amounts of insulin are unable to induce a normal insulin response in fat, muscle, and liver. As a result, blood glucose is not cleared out of the circulation, and the pancreas must produce additional insulin. Eventually, not enough insulin can be produced, and glucose is chronically elevated—a condition called type 2 diabetes. Cassia cinnamon (*Cinnamomum cassia*) can enhance insulin signaling in muscle and attenuate insulin resistance. The purpose of this review was to theorize a mechanism for cinnamon modulation of impaired glucose utilization as observed in people with sleep loss.

*The relationship between sleep loss and insulin resistance*

Insulin secretion and glucose tolerance have a circadian pattern throughout the day. However, this daily cycle is lost in people with type 2 diabetes. Glucose regulation of gene expression also has a daily pattern. Disruptions of the circadian cycles may predispose people to type 2 diabetes. In humans, the rate of glucose clearance has been reported to be 40% slower in sleep-deprived, healthy, young men. Also, the rate of glucose effectiveness, the extent that glucose can be cleared without insulin, was 30% lower during sleep deprivation. An 8-year prospective study of 2,265 Japanese electrical company workers revealed that workers who had sleep disturbances had a 2- to 3-fold higher risk of type 2 diabetes, and a survey of 8,269 German adults found a significant association between a lack of constant night sleep and the development of type 2 diabetes. Similar results were observed in the 10-year Nurses’ Health Study involving 70,026 subjects for women who slept less than 5 hours daily.
Effect of cinnamon
An in vivo study concluded that cassia cinnamon extract enhances insulin sensitivity in healthy rats. It is believed that cinnamon enhanced insulin-mediated tyrosine phosphorylation of skeletal muscle signaling proteins. This finding is important because skeletal muscle is the primary site of peripheral insulin resistance and insulin-mediated glucose uptake. Another in vivo study found that cassia cinnamon extract improved muscular insulin signaling in healthy rats on a high fructose diet, and early supplementation with the extract prevented insulin resistance. The study concluded that cassia cinnamon extract may reduce the negative effect of high fructose consumption on biochemical markers involved with impaired glucose metabolism.

The authors discuss 2 clinical trials that evaluated cassia cinnamon in healthy humans. One study was a placebo-controlled crossover study that evaluated 5 g of cassia cinnamon in 7 healthy, lean men. The study showed that this dose significantly reduced total plasma glucose response and enhanced insulin sensitivity (P values not reported) after a high carbohydrate load, whether taken with the glucose or 12 hours prior. The authors hypothesize that a similar benefit may occur in healthy people with poor sleep patterns. In the second study, 14 healthy participants were fed rice pudding with or without 6 g of ground cassia cinnamon in a crossover design. The cassia cinnamon lowered postprandial glucose and delayed gastric emptying (P<0.05 for both). It is unclear if there are additional published clinical studies and if so, why the authors chose to focus on these 2 studies.

The authors state that cassia cinnamon may be helpful for healthy, moderately sleep-deprived individuals, and they acknowledge that additional studies are needed. It is still uncertain whether sleep loss induces insulin resistance through impaired insulin signaling in insulin-sensitive cells. Human studies are needed to confirm the in vivo findings. The minimum effective dose of cinnamon for improving insulin sensitivity in healthy individuals is unknown. Although cinnamon is generally recognized as safe in doses up to 6 g, the proper dose of cinnamon should be established before recommendations are made. For reference, a large jar of cinnamon that is sold in bulk at warehouse stores contains approximately 300 g of cinnamon. Therefore, it is plausible that typical dietary intake of cinnamon would be beneficial. However, the only way to know for certain would be to conduct long-term, large-scale, clinical trials in healthy individuals who are mildly sleep-deprived. Also, clinical trials need to document the botanical identity, source, processing, and phytochemical content of the agent studied.

—Heather S. Oliff, PhD

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