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The impact of 5-hydroxytryptophan supplementation on sleep quality and gut microbiota composition in older adults: A randomized controlled trial

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Abstract

Background & aims: Sleep quality is a pivotal part of health and there is growing evidence on the association between gut microbiota composition and sleep quality. 5-Hydroxytryptophan (5-HTP) is known as a precursor of the sleep regulating neurotransmitter and hormone. However, efficacy of 5-HTP supplementation for improving sleep quality in older adults is unclear. Hence, the aim of this study is to assess the impact of 5-HTP supplementation on sleep quality and gut microbiota composition in older adults.

Methods: This is a single-blinded, 12-week parallel randomized controlled trial. Thirty older adults (66 ± 3 years) in Singapore were randomly assigned to either consume or not consume 100 mg 5-HTP daily. Every 4 weeks, sleep quality was assessed via both subjective (Pittsburg Sleep Quality Index) and objective (actigraphy watch) measures. A global sleep score (GSS) was obtained from the PSQI, where a GSS>5 defines as poor sleeper while a GSS≤5 defines as good sleeper. Blood serotonin level, urine melatonin concentration, gut microbiota composition and stool short chain fatty acids (SCFA) content were assessed at week 0 and 12. This study was registered in clinicaltrials.gov as [NCT04078724](https://clinicaltrials.gov/ct2/show/NCT04078724) (<https://clinicaltrials.gov/ct2/show/NCT04078724>).

Results: 5-HTP supplementation showed an overall favorable effect on certain sleep quality components and an increase in serum serotonin concentration. In particular, at week 12, not good sleepers but poor sleepers with 5-HTP supplementation were able to significantly improve subjective GSS (Δ SL_{5-HTP}: -2.80 ± 1.10 min, p-value = 0.005). In addition, they showed an increase in microbiota diversity (Simpson_{5-HTP} vs. Simpson_{Control}: 0.037 ± 0.032 a.u. vs. -0.007 ± 0.022 a.u.; p_{interaction}: 0.013) and relative abundance of SCFA producing bacteria in the gut.

Conclusions: 5-HTP supplementation can improve certain sleep quality components in older adults and this benefit was more prominently observed in poor sleepers. 5-HTP was also able to improve the gut microbiota composition in poor sleepers.

Keywords: 5-Hydroxytryptophan; Gut microbiota; Melatonin; Serotonin; Sleep quality; Tryptophan.

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