

Gut microbiome composition and functionality impact the responsiveness to a dairy-based product containing galacto-oligosaccharides for improving sleep quality in adults

Objective

Sleep quality has been linked to gut microbiota composition and function through the microbiota-gut-brain axis. Therefore, one strategy to improve sleep quality could be through the modulation of the gut microbiome. The effect of an intervention with a dairy-based product (DP) containing protein and galacto-oligosaccharides (GOS) on gut microbiota composition and function was assessed in a study with 70 healthy adult subjects with moderate sleep disturbances [1]. The study showed a beneficial effect of DP over placebo on sleep quality after 14 days of intervention.

Method

Associations of the gut microbiota with sleep quality and with response/non-response to the DP treatment were revealed by shotgun metagenomics sequencing of fecal DNA samples, and analyses of microbiota taxonomy and generic functionality. A database of manually curated Gut-Brain Modules (GBMs) [2] was applied to analyze specific microbial functions/pathways that have the potential to interact with the brain.

Results and Conclusions

A small effect of the DP treatment on gut microbiota composition and function was observed, which could be attributed to several species. As interindividual variance in microbiota composition could have given rise to a heterogeneous responsiveness of the subjects in the intervention group, we zoomed in on differences between responders and non-responders regarding improved sleep quality. Strikingly, there was a compositional difference between responders and non-responders at baseline. Significant differences were also observed when examining the microbial pathway profiles of responders/non-responders. Thus, on basis of the microbiome functionality analysis, we found leads with respect to the effectiveness and potential underlying mechanisms of mode of action in sleep improvement that could support future nutritional interventions to aid sleep improvement.

Ethics approval

The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the METC-Wageningen University, Wageningen, The Netherlands, on 6 September 2019. Dossier NL70673.081.19, METC nr 19/17 [1].

References

1. Schaafsma, A. *et al.*, 2021. *Nutrients* 13 (7), 2204.
- Valles-Colomer, M. *et al.*, 2019. *Nature microbiology* 4 (4):623 – 632.