

# #390 How does non-invasive neuromodulation work in children with neurodevelopmental disorders? A study in constipation and sleep quality



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## Hypothesis / aims of study

Children with neurodevelopmental disorders have a very wide clinical variability. A common prevalent factor that these children experience is problems with defecatory symptoms and constipation. We explore NESA non-invasive neuromodulation, since it can regulate the autonomic nervous system, and it is a non-invasive and painless electrotherapy that uses low frequency microcurrents. This device has demonstrated its effectiveness in sleep quality, chronic pain tolerance and other autonomic symptoms, therefore this study suggests that normalizing the functions of the autonomic nervous system can alleviate various of the defecatory symptoms seen in these children. The effectiveness of the intervention in patients with these disorders needs to be tested.

The objective of this study is to assess the efficacy and safety using NESA microcurrents as a treatment for constipation, as well as sleep quality, in children with neurodevelopmental disorders.

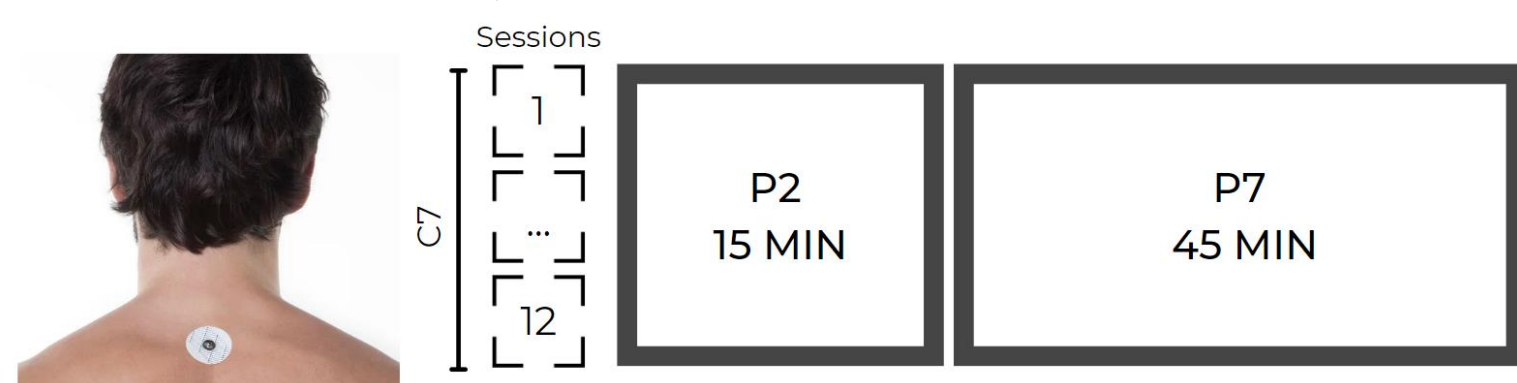
## Study design, materials and methods

This cross-sectional observational study included 23 children aged between 2 and 16. The subjects were treated with the NESA non-invasive neuromodulation device, which applies microcurrent therapy in different programming protocols using surface-applied microcurrent electrostimulation. The treatment was assessed three times per week for a total of four weeks, with each session lasting 60 minutes. During the therapy, participants maintained their usual routines and interventions. Data was collected before the treatment, four weeks into it and two weeks after the last intervention.

Measures:

- Bowel diary. Thanks to this instrument, we were able to register the number of bowel movements and the type of stool according to the Bristol Stool Form Scale (BSS)
- For sleep quality evaluation, a sleep diary was provided and answered. This information was obtained thanks to the families, therapist, teachers and other individuals in their environment..

Protocol used in this study:



Colocation of the device, with anklets, socks and the directional electrode



## Results and interpretation

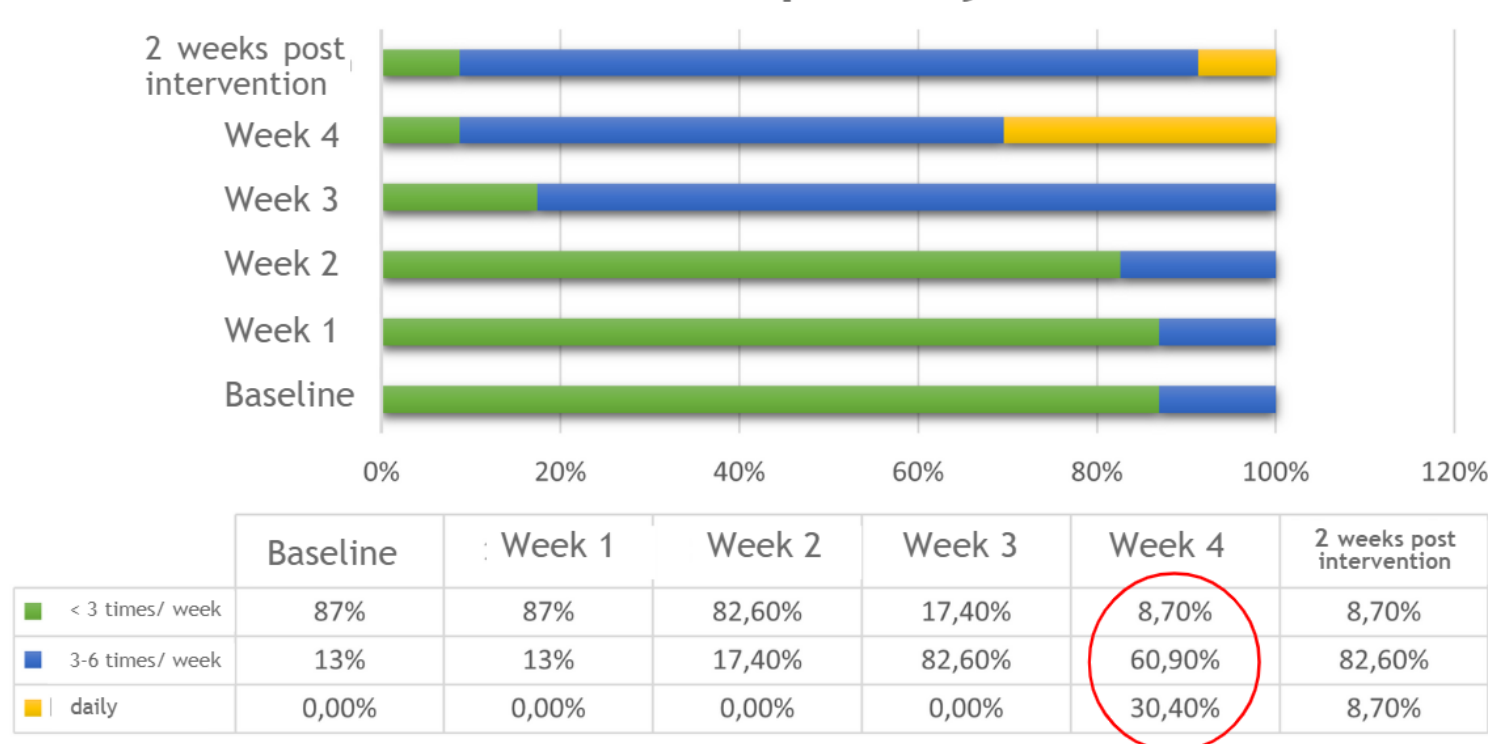
The results regarding the frequency of defecation indicate that all participants improved their bowel movements, with 60.9% of children having a defecation frequency of 3 to 6 times per week. Additionally, 30.4% of participants reported daily bowel movements.

Two weeks after the intervention, most children kept on maintaining the benefits from the treatment.

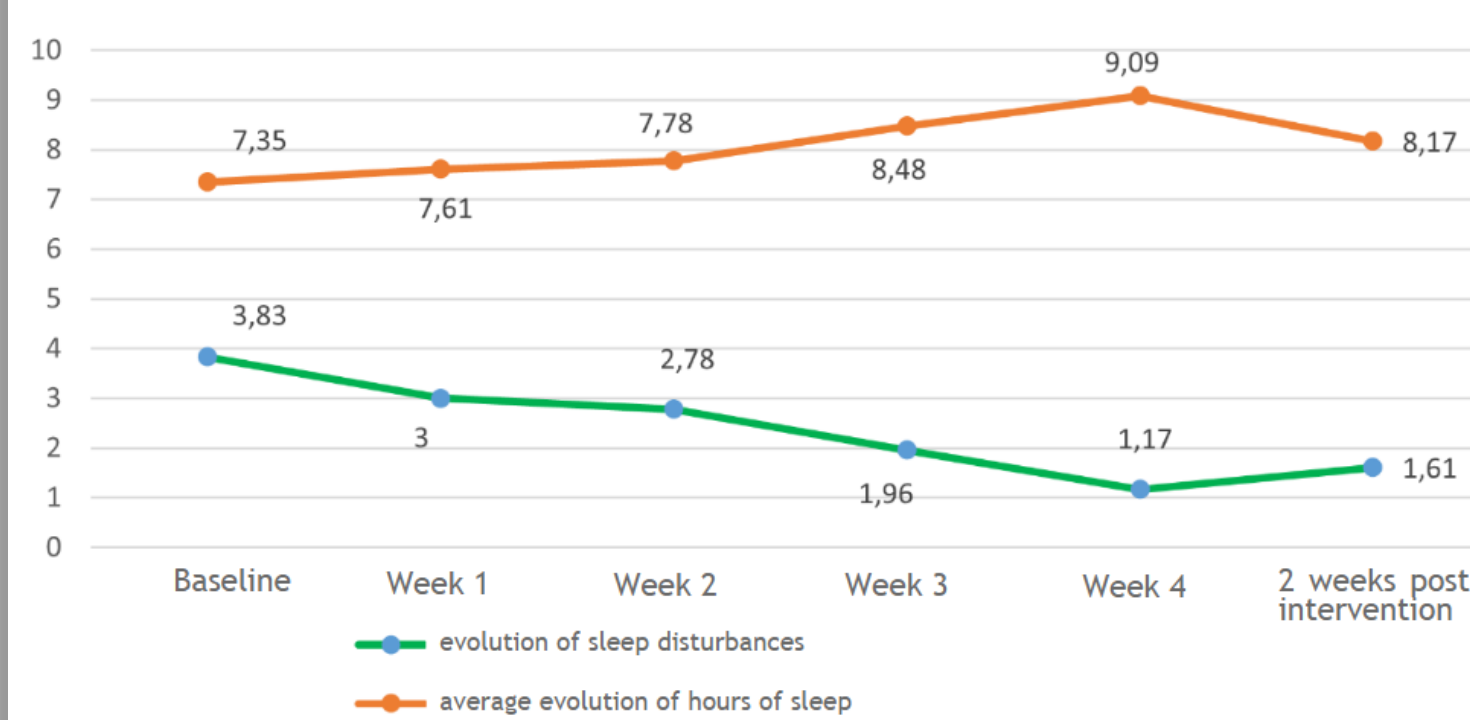
Upon analyzing the type of stool observed throughout the weeks, we can observe how prior to the intervention 69.6% of children had type 1 and 2 in the BBS scale. However, at the end of the treatment, this percentage decreases to 21.7%. On the other hand, normal considered stool increased its percentage from 21.7% to 78.3% of patients.

Regarding sleep quality, some benefits can also be observed. The number of interruptions in their sleep lowered and the total hours of sleep increased, especially through the end of the intervention

### Defecation frequency evolution



### Sleeping hours and number of interruptions



## Conclusions

NESA microcurrents treatment is beneficial for children suffering from constipation and for the consistency of stool. These improvements can be observed in a short period of time, with only four weeks of treatment, so we can guess that the intervention may have long-term benefits for these symptoms if applied consistently. This treatment improved their symptoms and overall quality of life. This may also lead to an improvement in the quality of life for their families and environment.

Moreover, investigation with other disorders or neurotypical children may have similar benefits to the ones obtained in this research.

In conclusion, NESA microcurrents can be used as an effective and safe treatment for improve quality of sleep and constipation in children with neurodevelopmental disorders.

## References

1. Medina-Ramírez, R., Molina-Cedrés, F., Báez-Suárez, A., & Álamo-Arce, D. (2021). Nesa Non-Invasive Neuromodulation; A New Frontier of Treatment of the Autonomous Nervous System in Physiotherapy. 4. DOI: <https://www.cientperiodique.com/article/CPQOS/5/4/97>
2. García F, Fernández D, Vázquez-Guerrero J, et al. (2022) Recovery of the physiological status in professional basketball players using NESA neuromodulation treatment during different types of microcycles in season: A preliminary randomized clinical trial. *Frontiers in Physiology*. 2022;13. <https://www.frontiersin.org/articles/10.3389/fphys.2022.1032020>
3. Teruel-Hernández E, López-Pina JA, Souto-Camba S, Báez-Suárez A, Medina-Ramírez R, Gómez-Conesa A. Improving Sleep Quality, Daytime Sleepiness, and Cognitive Function in Patients with Dementia by Therapeutic Exercise and NESA Neuromodulation: A Multicenter Clinical Trial. *International Journal of Environmental Research and Public Health*. 2023; 20(21):7027. <https://doi.org/10.3390/ijerph20217027>