SLEEP SPINDLE CHARACTERISTICS IN A NORMAL DEVELOPING INFANT POPULATION IN THE WESTERN CAPE OF SOUTH AFRICA

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INTRODUCTION

Sleep spindles are oscillating potentials generated in the thalamus of the brain and linked to memory consolidation during sleep. Absence in infants beyond 3 months of age indicate cognitive impairment.

AIM

1. To examine a cohort of 3–9-month-old infants to obtain standardized spindle density, frequency and duration in a South African population.
2. To compare sleep spindle characteristics of infants in socioeconomically challenged settings to those in higher income settings, from where most data originates.

METHODOLOGY

- Infants with normal developmental milestones and no evidence of neuro-insult were identified from the routine referrals for electroencephalogram (EEG).
- Most were referred for concerns of possible seizures, apneas or breath-holding events and subsequently found to have no abnormal neurology or neurological disorder.
- Retrospective examination of 55 patients' EEG performed between January 2018 and July 2023 was done.
- Manuel scoring of the density, frequency and duration of each was obtained and analyzed by a specialized pediatric EEG technologist, then independently rated by a Neurologist with experience in EEG analysis. Scoring differences were resolved by a pediatric Neurologist.
- Findings were statistically analyzed using Redcap and SPSS software.

RESULTS

Mean density, duration and frequency is displayed in Table 1. Average sleep density for all age groups were between 2-6 spindles/minute, with a mean of 3.8 spindles per minute. Average duration was 2.3 seconds and mean frequency was 12.46Hz. The average sleep time was 30 minutes.

Age in months	No of Participant	Mean Density	Std Dev	REF VALUE	Mean Duration	Std Dev	REF VALUE	Mean Frequency	Std Dev	RE VA
3	11	2.7	1.3	±3	3.4	1.6	>1.5	12.7	1.4	13
4	8	4.3	1.6	±3	2.2	0.7	>1.5	12.2	0.8	13
5	10	4.5	1.2	±3	2.4	0.9	>1.5	13.0	1.2	13
6	7	4.1	1.9	±3	2.3	1.0	>1.5	12.4	1.7	13
7	8	4.0	1.3	±3	1.6	0.6	>1.5	12.1	1.6	13
8	5	3.6	1.1	±3	1.8	0.4	>1.5	12.6	0.5	13
9	6	3.5	1.5	±3	1.7	0.6	>1.5	12.1	0.9	13
Total	55	3.8	1.4	±3	2.2	0.8	>1.5	12.4	1.1	13

Table 1: Mean density, duration and frequency of the different age groups (Reference values- Gruber and Wise: 2015)

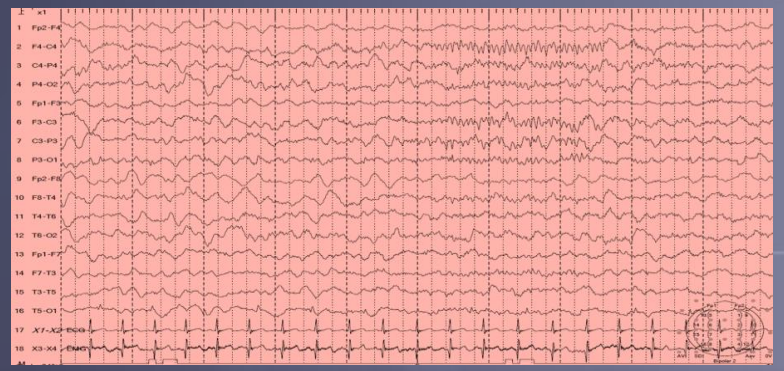

Figure 1: Sleep spindles over the centroparietal region, maximal on the left in a 5-month-old infant– Recording from Red Cross War Memorial Children's Hospital, Cape Town, South Africa.

CONCLUSION

- There were no significant differences between the density, duration and frequency of sleep spindles in infants between 3-9months of age in our sample and in comparison, to international data.
- There were no significant differences in the spindle characteristics of natural and melatonin-induced sleep.
- Establishing normative data of sleep spindle density, duration and frequency in this South African cohort is important and provides a foundation for further studies exploring sleep spindle formation in neurologically at-risk infants.

ACKNOWLEDGEMENTS

- Many thanks to the staff of Red Cross War Memorial Children's Hospital Paediatric Neurology and Neurophysiology Department for their assistance with this project.

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