

# Pengaruh Implantasi Eksosom dan Stimulasi Auditori Binaural Beat terhadap Perubahan Profil Gangguan Neurodevelopmental pada Anak = The Effect of Exosome Therapy and Binaural Beat Auditory Stimulation on Profile Changes of Neurodevelopmental Disorders in Children

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## Abstrak

**Latar Belakang.** Anak dengan gangguan neurodevelopmental memerlukan upaya terapi terpadu untuk meningkatkan kualitas hidupnya. Studi ini bertujuan mengetahui pengaruh implantasi eksosom, stimulasi auditori binaural beat, dan terapi konvensional terhadap lima domain BDI-2 pada anak dengan gangguan neurodevelopmental.

**Metode.** Studi kohort retrospektif dengan rekam medis di RSUPN dr. Cipto Mangunkusumo dan RSAB Harapan Kita dilakukan pada anak dengan gangguan neurodevelopmental yang menjalani terapi sejak Januari 2021-April 2023. Subjek dikelompokkan menjadi kelompok perlakuan mendapatkan implantasi eksosom, stimulasi auditori binaural beat, dan terapi konvensional, sedangkan kelompok kontrol hanya mendapatkan terapi konvensional. Luaran yang dinilai yaitu domain perkembangan BDI-2. Analisis univariat dan bivariat dilakukan sesuai kebutuhan.

**Hasil.** Terdapat 25 subjek kelompok perlakuan dan 25 subjek kelompok kontrol. Tidak ada perbedaan karakteristik kedua kelompok sebelum perlakuan, kecuali domain motorik. Terdapat perbedaan usia developmental global maupun lima domain BDI-2 sebelum dan sesudah perlakuan pada kelompok perlakuan dan kontrol dengan median peningkatan usia developmental global masing-masing yaitu 7,5 dan 2,2 bulan. Tampak perbedaan peningkatan usia developmental global dan lima domain setelah perlakuan yang bermakna antara kelompok perlakuan dan kelompok kontrol.

**Kesimpulan.** Implantasi eksosom dan stimulasi auditori binaural beat dapat meningkatkan usia developmental global dan lima domain perkembangan berdasarkan penilaian BDI-2 secara signifikan pada anak dengan gangguan neurodevelopmental.

.....**Background.** Children with neurodevelopmental disorders require integrated therapeutic efforts to improve their quality of life. This study aimed to determine the effect of exosome therapy, binaural beat auditory stimulation, and conventional therapy on five BDI-2 domains in children with neurodevelopmental disorders.

**Method.** Retrospective cohort study using medical records at dr. Cipto Mangunkusumo National Center General Hospital and RSAB Harapan Kita was conducted for children with neurodevelopmental disorders who underwent therapy from January 2021 to April 2023. Subjects were grouped into a treatment group receiving exosome therapy, binaural beat auditory stimulation, and conventional therapy, while the control group only received conventional therapy. The BDI-2 developmental domains were assessed. Univariate and bivariate analysis were performed as needed.

**Results.** There were 25 subjects in the treatment group and 25 subjects in the control group. There were no differences in subjects' characteristics between the two groups before treatment, except for the motor domain. There were differences in global and five BDI-2 domains developmental age before and after

treatment in the treatment and control groups with a median increase in global developmental age, respectively, 7.5 and 2.2 months. There were significant differences in the increase of global and five domains developmental age after treatment between the treatment group and the control group.

Conclusion. Exosome therapy and auditory binaural beat stimulation improve global and five domains developmental age significantly based on BDI-2 assessment in children with neurodevelopmental disorders.