Oxidative Stress, Motor Abilities, and Behavioral Adjustment in Children Treated for Acute Lymphoblastic Leukemia

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Purpose/Objectives: To examine associations among oxidative stress, fine and visual-motor abilities, and behavioral adjustment in children receiving chemotherapy for acute lymphoblastic leukemia (ALL).

Design: A prospective, repeated-measures design.

Setting: Two pediatric oncology settings in the southwestern United States.

Sample: 89 children with ALL were followed from diagnosis to the end of chemotherapy.

Methods: Serial cerebrospinal fluid samples were collected during scheduled lumbar punctures and analyzed for oxidative stress biomarkers. Children completed fine motor dexterity, visual processing speed, and visual-motor integration measures at three time points. Parents completed child behavior ratings at the same times.

Main Research Variables: Oxidative stress, fine motor dexterity, visual processing, visual-motor integration, and behavioral adjustment.

Findings: Children with ALL had below-average fine motor dexterity, visual processing speed, and visual-motor integration following the induction phase of ALL therapy. By end of therapy, visual processing speed normalized, and fine motor dexterity and visual-motor integration remained below average. Oxidative stress measures correlated with fine motor dexterity and visual-motor integration. Decreased motor functioning was associated with increased hyperactivity and anxiety.

Conclusions: Oxidative stress occurs following chemotherapy for childhood ALL and is related to impaired fine motor skills and visual symptoms.

Implications for Nursing: Early intervention should be considered to prevent fine motor and visual-spatial deficits, as well as behavioral problems.

Key Words: childhood leukemia; fine motor dexterity; visual-motor integration; oxidative stress; cerebrospinal fluid

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