Do survivors of childhood acute lymphoblastic leukemia have acquired ADHD?

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Abstract

- We explored the overlap of ADHD symptomatology and cognitive dysfunctions in survivors of acute lymphoblastic leukemia (ALL) and individuals with primary ADHD.
- Survivors of ALL exhibited fewer ADHD symptoms than individuals with primary ADHD; however, survivors had weaker processing speed and response inhibition scores.
- ALL survivors may exhibit a distinct pattern of cognitive and behavioral deficits than those with ADHD.

Introduction

- The therapy that effectively cures ALL also causes side effects in 40 – 60% of survivors, referred to 'late effects'.
- Cognitive late effects in ALL survivors are commonly found in working memory, attention and processing speed.
- Given the resemblance of late effects and symptoms of ADHD, some have suggested that a diagnosis of 'acquired ADHD' is warranted in ALL survivors.
- However, ALL survivors and children with primary ADHD have not been directly compared on relevant cognitive and behavioral functions.

- The objective was to determine how similar or different ALL survivors are directly compared on relevant cognitive and behavioral functions.

Descriptive statistics:

<table>
<thead>
<tr>
<th>ALL sample</th>
<th>ADHD sample</th>
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<tbody>
<tr>
<td>N = 80</td>
<td>N = 80</td>
</tr>
<tr>
<td>Sex: 50 males (63%) and 30 females (37%)</td>
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</tr>
<tr>
<td>Age range: 8.7-18.9 years</td>
<td>Age range: 8.0-17.0 years</td>
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<tr>
<td>Mean age: 13.4 years old</td>
<td>Mean age: 12.7 years old</td>
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<tr>
<td>Treatment intensity: 15 low risk; 44 standard risk; 18 high risk; 3 missing data</td>
<td>ADHD classification: 37 inattentive type; 10 hyperactive type; 33 combined type</td>
</tr>
<tr>
<td>Years since treatment: 2.5 - 10.9 years</td>
<td>Years since treatment: 6.1 years</td>
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</tbody>
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General cognitive abilities:

- Performance of ALL survivors was comparable on the WISC.
- The samples' means for the processing speed index were significantly different, t(72) = -2.43, p < 0.05.
- No effect of treatment intensity or years since treatment on processing speed index scores.

Results

ADHD symptoms:

- Approximately 20% of the ALL sample fell within clinical range on the Conners subtests for inattention and hyperactivity/impulsivity.
- The proportion of ALL survivors within clinical range is lower than that of the ADHD sample where ~77% fell within clinical range.
- ALL survivors are at significantly higher risk of being impaired relative to the general population (~5%).
  - Inattention: t(77) = 3.76, p < 0.001
  - Hyperactivity: t(77) = 2.75, p < 0.01
- No effect of treatment intensity or years since treatment on Conners scores.

Executive function:

- ALL survivors had weaker response inhibition scores than did individuals with ADHD: t(68) = 3.42, p < 0.01
- Individuals with ADHD had lower n-back scores than did ALL survivors:
  - 0-back: t(59) = 3.65, p < 0.001
  - 1-back: t(59) = 2.10, p < 0.05
- No effect of treatment intensity or years since treatment on SSRT and n-back scores.

Conclusions

- This is the first study to directly compare behavioral and cognitive functions in ALL survivors and individuals with primary ADHD.
- The proportion of ALL survivors with clinically significant ADHD symptoms was substantially lower than that of individuals with ADHD.
- However, in comparison to the general population, ALL survivors are at increased risk of exhibiting clinically significant ADHD symptoms.
- Both the ALL and the ADHD samples performed within the normal range on the WISC-IV indexes; however, the ALL sample had a weaker mean score for the processing speed index than the ADHD sample.
- ALL survivors performed more poorly on the response inhibition task than did individuals with ADHD, while the ADHD group had lower scores on the working memory task than did ALL survivors.
- Treatment factors did not contribute significantly to cognitive and behavioral functions in ALL survivors.
- Cognitive deficits may differ between ALL survivors and individuals with ADHD. The notion of acquired ADHD may not adequately capture the unique challenges faced by ALL survivors.

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