The Correlations between Results of Short-form Wechsler Adult Intelligence Scale-III and Demographic/Clinical Factors in Patients with Schizophrenia: Preliminary Findings

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Abstract

Objectives: Previous studies showed that the illness duration is related with cognitive performance in patients with schizophrenia. The Wechsler Adult Intelligence Scale (WAIS) has been used extensively to assess the cognitive function in schizophrenia in both research and clinical practice. In this study, we intended to analyze whether a correlation exists between the indices of short-form WAIS-III and demographic/clinical data (including illness duration, age at onset, and years of education). Methods: We included 34 patients with schizophrenia from a tertiary hospital in Taiwan. Each participant received assessment with the short-form WAIS-III, consisting of seven core subtests. It provided scores for verbal intelligence quotient (VIQ), performance intelligence quotient (PIQ), full-scale intelligence quotient (FSIQ), and four secondary indexes (verbal comprehension, working memory, perceptual organization, and processing speed). Data were analyzed for correlation. Results: The results showed that patients’ age at onset was significantly negatively correlated with years of education ($p < 0.05$). Significantly positive correlations existed between years of education and WAIS-III, including VIQ ($p < 0.01$), PIQ ($p < 0.05$), FSIQ ($p < 0.05$), VC (verbal comprehension) ($p < 0.05$), PS (processing speed) ($p < 0.05$), similarities ($p < 0.05$), information ($p < 0.05$), picture completion ($p < 0.05$), and digit symbol coding ($p < 0.05$). The negative correlations also significantly existed between age at onset and WAIS-III ($p < 0.05$), including VIQ ($p < 0.05$), FSIQ ($p < 0.05$), PO (Perceptual Organization) ($p < 0.05$), similarities ($p < 0.05$), arithmetic ($p < 0.05$), and block design ($p < 0.05$). The significant positive correlations were also found between illness duration and WAIS-III, including PS ($p < 0.05$), digit span ($p < 0.05$), and digit symbol coding ($p < 0.01$). Conclusion: The study that positive correlations existed between illness duration and cognitive function differs from previous studies. Those preliminary results also suggest that the education can maintain cognitive function, at least partially, even those have early-onset schizophrenia.

Key words: Education, illness duration, schizophrenia, Wechsler Adult Intelligence Scale-III

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Introduction

Patients with schizophrenia often have cognitive impairment, such as worsening attention, memory, language, executive functions, and general intelligence [1-8], and many factors affect the cognitive performance. The demographic characteristics of patients with schizophrenia may be important factors. Previous studies have found that the illness duration is related with cognitive performance in patients with schizophrenia [9].

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adopted and modified into WAIS-III. The short-form WAIS-III may have clinical potential for assessing global cognitive profile of schizophrenia [9]. Short-form WAIS-III includes the subtests of information, digit span, arithmetic, similarities, picture completion, block design, and digit symbol.

In this study, we intended to explore whether the correlations exist between the indices of short-form WAIS-III and demographic/clinical data — including illness duration, age at onset, and years of education.

**Methods**

**Study participants**

We included 34 patients with schizophrenia in the study, 20 inpatients and 14 outpatients from a medical center in southern Taiwan. The study was conducted from December 1, 2012 to November 30, 2013. The study protocol was approved by the Institutional Review Board of Chang Gung Memorial Hospital, with the requirement of obtaining signed informed consent from participating patients.

All patients had schizophrenia according to the DSM-IV criteria diagnosed by board-certified psychiatrists. All patients had fair medical compliance and relatively stable clinical state. Excluded were those with severe psychosis, visual or auditory disabilities, motor system disability, a history of substance abuse, mental retardation, brain injury, stroke, delirium, dementia, amnestic disorder, and other cognitive disorders.

**Study instruments**

The Chinese version of the WAIS-III was administered and scored according to the standardized procedures outlined in the manual [17]. We collected data on seven core subtests of the short-form WAIS-III (similarities, information, picture completion, block design, arithmetics, digit span, and digit symbol coding). Verbal intelligence quotient, performance intelligence quotient, full-scale intelligence quotient, and four secondary indices (verbal comprehension, perceptual organization, working memory, and processing speed) were then calculated.

**Statistical analysis**

The demographic/clinical data were presented with means, standard deviations, frequency distribution, and percentages. The correlation between the indices of short-form WAIS-III and demographic or clinical data was analyzed using Pearson’s correlation.

We used International Business Machine Statistical Package for Social Science software version 20 in Macintosh (IBM SPSS, Corp., Armonk, New York, USA) to compute all study data. The differences between groups were considered statistically significant if \( p < 0.05 \).

**Results**

In this study, we recruited 34 patients, including 20 inpatients and 14 outpatients. Table 1 presents demographic and clinical data of study participants. Table 2 shows the correlation between demographic/clinical data and the indices of short-form WAIS-III.

**Table 1. Demographic and clinical characteristics of patients with schizophrenia (n=34)**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>39.79 ± 10.61</td>
</tr>
<tr>
<td>Age at onset (years)</td>
<td>27.15 ± 9.12</td>
</tr>
<tr>
<td>Years of education</td>
<td>12.06 ± 2.77</td>
</tr>
<tr>
<td>Illness duration (years)</td>
<td>12.65 ± 6.37</td>
</tr>
<tr>
<td>Outpatients, n (%)</td>
<td>14 (41.2)</td>
</tr>
<tr>
<td>Inpatients, n (%)</td>
<td>20 (58.8)</td>
</tr>
<tr>
<td>Gender, n (%)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>14 (41.2)</td>
</tr>
<tr>
<td>Female</td>
<td>20 (58.8)</td>
</tr>
</tbody>
</table>

SD, Standard deviation

**Table 2. The correlation between demographic/clinical data and the indexes of short-form Wechsler Adult Intelligence Scale-III**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Years of education</th>
<th>Illness duration</th>
<th>Age at onset</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td></td>
<td>n</td>
</tr>
<tr>
<td></td>
<td>0.313</td>
<td>0.313</td>
<td>-0.375*</td>
</tr>
<tr>
<td>Illness duration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age at onset</td>
<td>-0.375*</td>
<td>-0.096</td>
<td></td>
</tr>
<tr>
<td>VIQ</td>
<td>0.447***</td>
<td>0.286</td>
<td>-0.344*</td>
</tr>
<tr>
<td>PIQ</td>
<td>0.378*</td>
<td>0.329</td>
<td>-0.314</td>
</tr>
<tr>
<td>FSIQ</td>
<td>0.431*</td>
<td>0.316</td>
<td>-0.366</td>
</tr>
<tr>
<td>Verbal comprehension</td>
<td>0.526**</td>
<td>0.238</td>
<td>-0.335</td>
</tr>
<tr>
<td>Perceptual organization</td>
<td>0.298</td>
<td>0.185</td>
<td>-0.394*</td>
</tr>
<tr>
<td>Working memory</td>
<td>0.218</td>
<td>0.216</td>
<td>-0.313</td>
</tr>
<tr>
<td>Processing speed</td>
<td>0.368*</td>
<td>0.430*</td>
<td>-0.121</td>
</tr>
<tr>
<td>Similarities</td>
<td>0.548**</td>
<td>0.231</td>
<td>-0.382</td>
</tr>
<tr>
<td>Arithmetics</td>
<td>0.225</td>
<td>0.127</td>
<td>-0.436**</td>
</tr>
<tr>
<td>Digit span</td>
<td>0.283</td>
<td>0.414*</td>
<td>-0.115</td>
</tr>
<tr>
<td>Information</td>
<td>0.461**</td>
<td>0.191</td>
<td>-0.259</td>
</tr>
<tr>
<td>Picture completion</td>
<td>0.347*</td>
<td>0.161</td>
<td>-0.259</td>
</tr>
<tr>
<td>Digit symbol coding</td>
<td>0.385*</td>
<td>0.442**</td>
<td>-0.108</td>
</tr>
<tr>
<td>Block design</td>
<td>0.177</td>
<td>0.165</td>
<td>-0.415*</td>
</tr>
</tbody>
</table>

*p < 0.5, **p < 0.01 tested using Pearson correlation (n=34). VIQ, verbal intelligence quotient; PIQ, performance intelligence quotient; FSIQ, full-scale intelligence quotient

**Discussion**

The results in this study (Table 2) showed significantly positive correlations existed between education and cognitive functions (\( p < 0.05 \)). The finding of this study is consistent with that of previous studies. Takeda and Shen in 2015 have summarized pointed out factors in improving cognitive reserve, i.e., preventing dementia, which is a kind of common cognitive deficit disease. Those factors include social activities, such as higher educational history [18]. In the Rotterdam study with a cross-sectional survey on 7,528 community residents, Ott et al. and associates in 1995 found that a substantially higher prevalence of dementia, particularly Alzheimer’s disease, has been found in participants with a low level of education [19]. In the American nun study with longitudinal on 93 nun participants aged 75–95 years, Snowdon et al. and associates in 1996...
also found that nuns with poor cognitive function even some with confirmed Alzheimer’s disease through postmortem autopsy have been found to be correlated with those with low linguistic ability (idea density and grammatical complexity) in autobiographies written in their early life [20].

Our study (Table 2) revealed that positive correlations existed significantly between illness duration and cognitive function ($p < 0.05$) and that negative correlations also existed significantly between age at onset and cognitive functions ($p < 0.05$); those findings are different from those from previous studies. Our study participants had a unique characteristic, i.e., earlier onset age was associated with higher education.

Language ability is also achieved through education, unnecessarily to be counted in school years. We suggest that education play a more important rôle as the cognitive protective factor. A review article also suggests that cognitive reserve is important in neuropsychiatric disorders including schizophrenia, bipolar disorder, and depression. Education is one of the ways to enhance cognitive reserve [21]. Patients with schizophrenia unavoidably experience cognitive impairment. The results of our study may prove again the years of education can maintain cognitive function, at least partially, even those have early onset schizophrenia.

**Study limitations**

The readers are warned not to overinterpret the study results because this study has three limitations:

- The major limitation of this study is the sample size. In this study, we only recruited 34 patients, so the statistical power may not powerful
- We did not compare patients’ other characteristics, such as inpatient status, outpatient status, and gender
- This is a cross-sectional study. The participants were tested for only one time.

Further studies with bigger sample sizes are needed in various patients with schizophrenia.

**Summary**

This study showed that correlations existed between cognitive function (short-form WAIS-III) and demographic/clinical characteristics of patients with schizophrenia. Moreover, the years of education may be a protective factor in patients with schizophrenia. However, this study finding should be considered as preliminary because it needs to be duplicated in large samples from various centers.

**Acknowledgment**

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A preliminary version of this study data was presented at the International Congress of the World Psychiatric Association in Mexico City, Mexico, September 27–30, 2018.

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Nil.

**Conflicts of Interest**

There are no conflicts of interest.

**References**