Factors Influencing the Tendency to Attention Deficit Hyperactivity Disorder among Elementary School Children

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Abstract. Purpose: The purpose of this study was to investigate the prevalence of attention deficit hyperactivity disorder (ADHD) among elementary school children in South Korea and identify influencing factors of ADHD tendency. Methods: A self-report survey was conducted upon 4th-6th grade elementary schoolchildren in South Korea. One hundred and fifty five elementary schoolchildren were included in the study. The instruments used in the present study were Korean Parent and Teacher ADHD Rating Scale and Lifestyle-related Questionnaire. Statistical analysis was performed using SPSS WIN 18.0 program. For data analysis, t-test, and multiple logistic regression were used. Results: The average ADHD score of the participants was 25.22, which indicates moderate level of ADHD. Our findings showed that 59% of the subjects had a ADHD tendency. Significant predictors of ADHD tendency were ‘unbalanced diet’, ‘gender’, ‘school achievement’, ‘breakfast’ and ‘fast food intake’. The present analysis of the dietary factors affecting ADHD in older elementary students found that children on an unbalanced diet were 14.63 times more disposed toward ADHD than those who maintained a balanced diet. Conclusion: The findings of the present study suggest that special concerns should be made for early detection of ADHD in elementary school children. In particular, specific strategies focusing on food intake pattern and fast food intake may effectively reduce the risk of ADHD in elementary school children.

Keywords: attention deficit hyperactivity disorder; education

1 Introduction

Attention Deficit Hyperactive Disorder (ADHD) is one of the most common psychiatric disorders observed in approximately 5-12% of children [1]. The causes of ADHD have not been established. Yet, studies have reported that intake of sugar and caffeine is associated with ADHD, that the consumption of fast food, processed milk, carbonated soft drinks and ionized beverages is highly likely to cause ADHD[2], and that a low dietary habit score with a high frequency of snack consumption leads to a high ADHD score[3]. Some studies have found ADHD is affected by dietary habits...
and manifests itself more frequently in boys [2][3], whilst others have analyzed the correlation between ADHD and obesity, lifestyles, overall dietary habits and frequency of processed food intake in childhood [4]. Nonetheless, the extent to which childhood obesity, lifestyles, consumption of processed foods and dietary habits affect ADHD has been hardly investigated from a systematic and holistic perspective. For this reason, the present study intends to provide reference data for developing nursing intervention programs for prevention and treatment of ADHD in line with the progress of severity by establishing the factors influencing ADHD in older elementary students.

1.1 Purpose

This study is to analyze the factors affecting ADHD in older elementary students.

1.2 Methods

This descriptive survey research was designed to analyze the factors affecting ADHD in older elementary students.

1.3 Setting and Sample

Data were collected from the upper graders of elementary schools located in P region from July 14th, 2014 to August 15th, 2014. The sample size was estimated with G*power 3.1 program. Thus, the number of participants (n=155) met the requirement for the logistic regression analysis.

1.4 Measurement

(1) General characteristics

To identify the general characteristics including body measurements, each respondent's gender, grade, height, weight, number of hours spent on computer at a time, amount of time spent on smartphone, number of hours spent watching TV daily and school credit were collected.

(2) Dietary habits and frequency of processed food consumption

The questionnaire used here referred to the Korea National Health and Nutrition Examination Survey[5] and was adapted for the purpose of this research prior to the preliminary survey with the children and revision.

(3) ADHD(Attention Deficit Hyperactivity Disorder)

The present study used the ADHD diagnosis scale defined in the Diagnostic and Statistical Manual of Mental Disorder-IV(DSM-IV 1994). So, Noh, Kim, Ko and Koh[6] investigated the reliability and validity of the research with elementary students, and reported an internal consistency of Cronbach α= .77-.89. The reliability of the present research is Cronbach α= .89.
1.5 Data analysis

Statistical analysis was performed using SPSS WIN 18.0 program. For data analysis, t-test, and multiple logistic regression were used.

2 Results

2.1 Comparison of characteristics between non-ADHD and ADHD group

Table 1. Comparison characteristics between non-ADHD and ADHD group (N=155)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Categories</th>
<th>Non-ADHD(n=88)</th>
<th>ADHD(n=67)</th>
<th>$\chi^2$ or t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADHD scores</td>
<td></td>
<td>9.70±6.05</td>
<td>25.22±6.23</td>
<td></td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Gender</td>
<td>Boy</td>
<td>34(38.6)</td>
<td>42(62.6)</td>
<td>8.80</td>
<td>.004</td>
</tr>
<tr>
<td></td>
<td>Girl</td>
<td>54(61.4)</td>
<td>25(37.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI (Body Mass Index)</td>
<td></td>
<td>26.33±5.25</td>
<td>28.45±6.12</td>
<td>-2.31</td>
<td>.002</td>
</tr>
<tr>
<td>Computer (week)</td>
<td></td>
<td>3.74</td>
<td>3.70</td>
<td>1.17</td>
<td>.866</td>
</tr>
<tr>
<td>Cellphone (day)</td>
<td></td>
<td>2.92</td>
<td>3.40</td>
<td>3.40</td>
<td>.001</td>
</tr>
<tr>
<td>School achievement</td>
<td></td>
<td>1.67</td>
<td>1.88</td>
<td>-2.03</td>
<td>.044</td>
</tr>
<tr>
<td>Meal frequency (day)</td>
<td></td>
<td>2.25</td>
<td>2.60</td>
<td>-2.84</td>
<td>.005</td>
</tr>
<tr>
<td>Breakfast frequency (week)</td>
<td></td>
<td>3.53</td>
<td>3.40</td>
<td>-4.25</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Regular dinner</td>
<td></td>
<td>1.69</td>
<td>1.93</td>
<td>-2.34</td>
<td>.021</td>
</tr>
<tr>
<td>Mealtime rate</td>
<td></td>
<td>1.58</td>
<td>1.99</td>
<td>-5.27</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Unbalanced diet</td>
<td></td>
<td>1.47</td>
<td>1.75</td>
<td>-2.9</td>
<td>.004</td>
</tr>
<tr>
<td>Fast food intake</td>
<td></td>
<td>41.78</td>
<td>46.69</td>
<td>-2.53</td>
<td>.012</td>
</tr>
</tbody>
</table>

2.2 Predictors of ADHD in Schoolchild

Table 2. Multiple Logistic Regression – Predictors of ADHD in Schoolchild (N=155)

<table>
<thead>
<tr>
<th>Variables</th>
<th>B</th>
<th>SE</th>
<th>Wald</th>
<th>p</th>
<th>OR</th>
<th>(95% CI for OR)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td>Gender</td>
<td>1.73</td>
<td>.54</td>
<td>10.29</td>
<td>.001</td>
<td>5.68</td>
<td>1.96</td>
</tr>
<tr>
<td>School achievement</td>
<td>1.33</td>
<td>.44</td>
<td>9.29</td>
<td>.002</td>
<td>3.80</td>
<td>1.60</td>
</tr>
<tr>
<td>Breakfast (week)</td>
<td>.92</td>
<td>.30</td>
<td>9.00</td>
<td>.003</td>
<td>2.52</td>
<td>1.37</td>
</tr>
<tr>
<td>Unbalanced diet</td>
<td>2.68</td>
<td>.67</td>
<td>15.86</td>
<td>&lt;.001</td>
<td>14.63</td>
<td>3.90</td>
</tr>
<tr>
<td>Fast food intake</td>
<td>.06</td>
<td>.02</td>
<td>6.27</td>
<td>.012</td>
<td>1.06</td>
<td>1.01</td>
</tr>
<tr>
<td>(Constant)</td>
<td>-.27</td>
<td>.16</td>
<td>2.82</td>
<td>.093</td>
<td>.93</td>
<td></td>
</tr>
</tbody>
</table>

Nagelkerke $R^2$=.59; $p<.001$; Hit ratio=81.9%; Each variable adjusted for all other variables in the table; SE=Standardized Error; OR=Odds ratio; CI=Confidence interval.
3 Discussion and Conclusions

The present analysis of the dietary factors affecting ADHD in older elementary students found that children on an unbalanced diet were 14.63 times more disposed toward ADHD than those who maintained a balanced diet. Gender (by 5.68 times), school credits (by 3.80 times), the frequency of breakfast (2.52 times) and the frequency of processed food intake (1.06 times) were associated with a higher disposition toward ADHD. Previous studies analyzed the correlation between ADHD and the dietary factors in line with the disposition toward ADHD without paying attention to the factors influencing ADHD, which is why it is difficult to directly compare the present findings with previous ones. Still the correlational research by Son and Kim[7] reported a higher relevance between ADHD scores in children and their irregular meal time, preference for treats to staples, eating while watching TV, and frequent consumption of ramen and confectionary. Jang and Kim[8] found boys received higher ADHD scores than girls and showed unfavorable dietary habits in regard of breakfast, balanced diet and frequencies of fruit and milk intakes in comparison to non-ADHD students. Notably, they showed a significantly frequent consumption of ramen. Likewise, the higher the ADHD scores, the higher the caffeine intake. In contrast to previous studies analyzing correlations only, the factors found in the present research to affect ADHD should be used for developing nursing intervention programs for ADHD prevention and treatment applicable to older elementary students. Moreover, the effects of such programs need be analyzed by further studies.

References

3. Lim I-S. A study on the correlation between nutritional status and the predisposition of ADHD of the children aged 4-6 years old[thesis]. Masan:Kyungnam University;2008.