

Short communication

Establishing the cut-off point

for the Oppositional Defiant Behavior Inventory

Yuzuru Harada, M.D.¹, PH.D., Kazuhiko Saitoh M.D.², PH.D.
Junzo Iida M.D., PH.D.³, Daimei Sasayama M.D.¹, Ayako Sakai, M.D.¹,
Junko Imai, M.D.¹, Hidemi Iwasaka M.D.⁴, Michiko Hirabayashi M.D.,
PH.D.⁵, Satoru Yamada M.D., PH.D.⁶, Shinichi Hirabayashi M.D.,
PH.D.⁷, Tokio Uchiyama M.D., PH.D.⁸, Naoji Amano, M.D., PH.D.¹

1. Mental Health Clinic for Children, Shinshu University Hospital
2. Kohnodai Hospital, National Center of Neurology and Psychiatry
3. Nara Medical University, College of Nursing
4. Nara University of Education
5. Matsumoto Kyoritsu Hospital
6. Tokyo Metropolitan Umegaoka Hospital
7. Nagano Children's Hospital
8. Otuma Women's University

The author responsible for correspondence and offprint; Yuzuru Harada. Mental Health Clinic for Children, Shinshu University Hospital, 3-1-1 Asahi, Matsumoto, Nagano, 390-8621 Japan. Telephone; 0263-37-3381, Facsimile; 0263-37-3060

(〒390-8621 松本市旭 3-1-1, 信州大学医学部附属病院 子どものこころ診療部 原田 謙, 電話:0263-37-3381, FAX: 0263-37-3060)

E-mail; y-harada@hsp.md.shinshu-u.ac.jp

Running title: The cut-off of the ODBI

The number of figure is 1 and the number of words is 1376.

This article is submitted for the child and adolescent psychiatry.

Abstract

We made a detailed examination of the cut-off point for the Oppositional Defiant Behavior Inventory (ODBI). The subjects were untreated 56 boys (6-15 years), who were diagnosed to have ODD and presented at our hospitals between December 2001 and March 2008. Controls were 690 boys with no history of contacting hospitals with any developmental or behavioral disorders at two elementary schools and two junior high schools in a city and its suburbs. It was shown that the level of opposition in boys could be evaluated regardless of the age groups by the ODBI, because there was no significant difference in the ODBI score for the one-way analysis of variance. Based on the sensitivity (88.2%), specificity (90.0%), positive predictive value (75.0%) and negative predictive value (95.7%), a score of 20 points was thus established, as a suitable cut-off point to distinguish the children who seemed to be needed ODD diagnosis from screened children.

Key words: oppositional defiant disorder, inventory, sensitivity, specificity, cut-off point

Introduction

We developed an evaluation scale as a supplementary tool for the diagnosis of oppositional defiant disorder (ODD) and named it the Oppositional Defiant Behavior Inventory (ODBI). The ODBI is composed of 18 items that show concrete oppositional behaviors, using the rating scale format. Each item is rated on a four-point scale ranging from "0" (rarely) to "3" (always). We previously reported its internal consistency, test-retest reliability, concurrent validity and divergent validity to be sufficiently accurate¹. (The ODBI in either the Japanese or English version will be sent to anyone who desires to receive a copy from the author.)

It is necessary to determine the cut-off point to use the ODBI in clinical situations. Generally, such an evaluation scale could be used for the mass screening, the secondary screening or the assistance of clinical diagnosis. The cut-off point should therefore be changed according to the purpose. When used for mass screening, the cut-off point should be set as low as possible and sensitivity should be raised not to lose true-positive samples, even if the number of false-positive samples increases to some extent. When used to help make a clinical diagnosis, on the contrary, the cut-off point should be set as high as possible and the specificity should be raised to reduce the number of false-positive samples to a minimum. For secondary screening, the balance of sensitivity and specificity would be needed as the

middle of these two situations. Oppositional Defiant Disorder was not so familiar in general that it seemed to be necessary to distinguish the children who needed clinical diagnosis and treatment from screened children. The purpose of this study is therefore to determine the cut-off point of the ODBI for the secondary screening.

Methods

Subjects

The subjects used for the statistical analysis comprised untreated patients ranging from six to 15 years of age, who were diagnosed to have ODD and presented at our hospitals between December 2001 and March 2008. Diagnoses were made by experienced child psychiatrists or child neurologists based on DSM-IV². We excluded any children that had major sensorimotor handicaps, psychosis, autism, or an estimated Full Scale IQ less than 70. The parents of 68 patients (56 boys, 12 girls) agreed to participate in our study and completed surveys. The statistical examination could be performed only for 56 boys, since the number of girl subjects was too small. The mean age was 10.3 years old (SD=2.7, range = 6 to 15).

Controls were 816 boys at two elementary schools and two junior high schools in a city and its suburbs, who had no history of contacting hospitals with any developmental or behavioral disorders by the survey questionnaires in the schools. Their

socio-economic statuses were thought to be middle class and closely homogeneous based on the findings of the same questionnaires. The parents of the 690 boys, i.e. 84.6% of the Controls, agreed to participate in our research and completed surveys. The mean age was 10.4 years old (SD=2.7, range = 6 to 15).

The objectives of the study were explained in writing to the guardians of the subjects and controls, and all gave their informed consent.

Procedure

The ODBI was given to the guardians of the subjects before the beginning of treatment and to those of the Controls.

Measures

The following examinations were carried out based on the obtained results:

1. The subjects were divided into three groups according to age and compared a score by the one-way analysis of variance. They were a 6- to 9-year-old group (18 boys), a 10- to 12-year-old group (18 boys) and a 13- to 15-year-old group (20 boys).

2. Regarding the ODBI score of 56 boy subjects and 690 Controls, the sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) were calculated.

Two-tailed tests of significance were used and the level of

significance was set at $p=0.05$. All data were analyzed using the SPSS 10.0 program - Windows version.

Results

1. The mean ODBI score of the 6- to 9-year-old group was 31.1 (SD=10.6), while that of the 10- to 12-year-old group was 32.2 (SD=11.2) and that of the 13- to 15-year-old group was 31.2 (SD=11.0). No significant difference was observed among the three age groups ($F=0.435$, $p=0.649$). From this analysis of variance, it was shown that the level of opposition could be evaluated regardless of the age groups by the ODBI in boys.

2. The sensitivity, specificity, PPV, and NPV of the ODBI scores are shown in Figure 1.

<Please insert Figure 1 here>

Discussion

Regarding the ODD criteria of DSM-IV², the following note should be taken into consideration for the diagnosis: [The criteria should be assumed to be met only if the behavior occurs more frequently than is typically observed in individuals of comparable age and developmental level]. It is difficult, however, to judge the abnormal level of opposition for not only guardians but also for child psychiatrists or neurologists. Because of this, we developed a tool that could measure oppositional characteristics. The level of opposition can be easily judged by using this scale,

because it is shown as a simple number.

When determining the cut-off point to distinguish the children who seemed to be needed ODD diagnosis from screened children we based our findings on the balance of the sensitivity and specificity. When the cut-off was 21 or more, the specificity was more than 90% but the sensitivity was less than 86%. PPV was over 75% but NPV was under 95%. Although the false positive rate decreased and the ratio of the subjects that had both the positive results by the scale and the disorders increased, the false negative rate also increased. When the cut-off was 19 or less, the sensitivity was over 88% but the specificity under 89%. PPV was under 75% but NPV was over 95%. Namely the false negative rate decreased but the false positive rate increased.

When the cut-off was 20, the sensitivity was 88.2%, the specificity was 90.0%, PPV was 75.9% and NPV was 95.7%, which were thus considered to be sufficiently useful values. Therefore, a score 20 was thus determined to be the most suitable cut-off point.

This time, a statistical examination could not be performed for girls, since the number of girl subjects was too small. In the future we should increase the number of girl cases and re-examine the cut-off point of girls.

The consultation history and the socio-economic status of Controls were judged based on the findings of questionnaires given at the schools. Essentially, such information should be determined by another interview or questionnaire. However, this could not

be carried out due to various circumstances on the part of the schools.

The concurrent use of this scale is considered to help in selecting children who may have a diagnosis of ODD. It remains, however, originally a screening scale. Regarding the children beyond the cut-off point, it is necessary that the expert child psychiatrists or child neurologists should make such a final diagnosis based on further medical examinations and the other psychometrics.

References

1. Harada Y, Saitoh K, Iida J et al. The reliability and validity of the Oppositional Defiant Behavior Inventory. *Eur. Child Adolesc. Psychiatry.* 2004; 13: 185-90
2. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders.* 4th edn (DSM-IV). American Psychiatric Association, Washington, DC, 1994

