



Comorbid Psychiatric Symptom Associated With Oppositional Defiant Symptom in Community School-Age Children

Yong Hun Kim¹, Duk-Soo Moon², and Na Ri Kang²

¹Jeju National University School of Medicine, Jeju, Korea

²Department of Psychiatry, Jeju National University School of Medicine, Jeju, Korea

Objectives: Oppositional defiant disorder (ODD) is often comorbid with other psychiatric disorders in childhood. This study aimed to investigate comorbid psychiatric symptoms and associated factors in elementary school children with symptoms of ODD.

Methods: The participants consisted of 205 mother-offspring pairs. Psychiatric symptoms were measured using the Diagnostic Predictive Scales and Korean Child Behavior Checklist. Psychiatric comorbid symptoms were compared between children with ODD symptom and those without ODD symptom. Multivariate logistic regression analysis was used to estimate the odds ratio of psychiatric symptom on ODD.

Results: ODD group had a significant association with internalizing and externalizing problem ($p=0.001$, $p<0.001$, respectively). ODD group were more comorbid with anxiety disorder, depressive disorder, attention-deficit/hyperactivity disorder, and conduct disorder. Among psychiatric disorder, generalized anxiety disorder (GAD) (adjusted odds ratio [AOR]=18.620, $p<0.001$) and conduct disorder (AOR=9.529, $p=0.014$) were associated with ODD symptom.

Conclusion: These findings suggest that children with ODD symptom had significantly higher rates of comorbid psychiatric symptoms. And GAD and conduct disorder are related to ODD symptom.

Keywords: Oppositional defiant disorder; Children; Comorbidity.

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Address for correspondence: Na Ri Kang, Department of Psychiatry, Jeju National University School of Medicine, 15 Aran 13-gil, Jeju 63241, Korea
Tel: +82-64-717-1850, Fax: +82-64-717-1849, E-mail: ilnaree@hanmail.net

INTRODUCTION

Oppositional defiant disorder (ODD) is characterized by a consistently argumentative and defiant attitude and behavior towards authoritative figures, along with persistent anger and irritability, leading to impairments in various areas, including school life, interpersonal relation, and emotional and behavioral regulation [1]. The lifetime prevalence of ODD has been reported as 10.2% [2], and its onset is influenced by a complex interplay of biological factors and environmental factors, such as caregiver's mental health problems, family functioning and parenting styles, and health problems during prenatal period [3].

ODD in children and adolescents is a risk factor for wide-ranging psychopathologies in their later adult lives and is linked to various comorbid psychiatric disorders. The prevalence of comorbid attention-deficit/hyperactivity disorder

(ADHD) and ODD is well known [4], and conduct disorder (CD) and anxiety disorder are also common comorbidities [5].

In Korea, children with ODD were assessed to have more severe comorbid psychopathology compared to the control group and were found to have experienced dysfunctional families and more prenatal and perinatal health problems [6]. Particularly, comorbid CD and anxiety have the adverse impact on the therapeutic efficacy and functional impairment of ODD, and a study conducted on the lifetime prevalence of ODD and comorbidities in adults reported that 92.4% of adults with ODD exhibit one or more comorbid psychiatric disorder, with 45.8% mood disorder and 62.3% depressive disorder [2].

Children often have both internalizing and externalizing problems, and despite the clinical significance of the diagnosis and evaluation of ODD, not many studies have investigated ODD independently. Considering that the presence of various comorbid psychiatric symptoms adversely affects the treatment and progression of ODD and lead to psychiatric disorders in adulthood, it is crucial to evaluate comorbid psy-

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chiatric symptoms in children with ODD and investigate the impacts of comorbid psychopathology on ODD in children.

The aim of this study is to identify the environmental factors, such as prenatal health problems and maternal depressive mood, examine comorbid psychiatric symptoms, and identify comorbid psychiatric symptoms that are significantly associated with ODD symptoms.

METHODS

Participants and method

Children who have continuously attended an elementary school in Jeju Special Self-Governing Province for six months or longer and their parents were enrolled in this study. With the cooperation from the Jeju Special Self-Governing Provincial Office of Education, two elementary schools were selected, and the study information announcement, including an information sheet describing the background of the study as well as consent form, were sent to each family to recruit volunteers. Data were collected by sending the questionnaire to the families that consented to participate in the study and retrieved by a mental health professional trained about the background of the study and contents of the questionnaire. A total of 205 mother-child dyads completed the questionnaire. The data were collected from September 2017 to December 2017. The study was approved by the Institutional Review Board of Jeju National University Hospital (Grant No. 2016-05-013).

Instruments

Diagnostic Interview Schedule for Children Predictive Scales

The Diagnostic Interview Schedule for Children Predictive Scales (DPS) is the primary screening tool for the Diagnostic Interview Schedule for Children (DISC)-IV, a structured interview schedule developed based on the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) [7] diagnostic criteria. The DPS for parents is a self-report questionnaire consisting of 92 questions about the symptoms of a psychiatric disorder that have been present in the child in the past year and eight questions about problems with child's mood and behaviors when the child is at home, school, or with friends. Although it is a simple scale, the DPS is a reliable and effective tool for making a DISC-IV diagnosis [8].

In this study, we used the DPS used in the Korea National Epidemiology Study on Children and Adolescents [9]. The major psychiatric disorders that are common in children and adolescents (ODD, generalized anxiety disorder [GAD], social anxiety disorder, panic disorder, agoraphobia, separa-

tion anxiety disorder, posttraumatic stress disorder [PTSD], obsessive compulsive disorder [OCD], ADHD, CD, depressive disorder, eating disorder, tic, and elimination disorder) were diagnosed based on the cutoffs proposed by Cubo et al. [10]. Children with significant clinical symptoms of ODD were assigned to the ODD group, and the remaining children were assigned to the control group.

Korean Child Behavior Checklist

Child Behavior Checklist (CBCL) is a tool developed by Achenbach and Edelbrock [11] and is commonly used to evaluate child behavior in clinical practice. In Korea, it was standardized and validated by Lee et al. [12]. Korean version CBCL (K-CBCL) comprises 8 empirically based syndrome subscales: withdrawal, somatic complaints, anxious/depressed, social problems, thought problems, attentional problems, delinquent behaviors, and aggressive behaviors. Additionally there were two broadband scales: internalizing and externalizing problems. T scores are based on general population norms and defined as the conversion of a raw score to an age-, sex-standardized score in the general population. The T scores of the K-CBCL were used in the current study. A higher score indicates more emotional and behavioral problems.

Korean version of the Beck Depression Inventory-II

Korean version of the Beck Depression Inventory-II (BDI-II) is a self-report scale developed by Beck and colleague in 1996 [13], and it consists of 21 items based on the diagnostic criteria for major depressive disorder on DSM-IV. Each item is rated on a Likert scale form 0 to 3, and a higher total summed score indicates more severe depression. In the present study, we used the tool standardized with established reliability (Cronbach's $\alpha=0.91$) for use on mothers [14].

Center for Epidemiological Studies Depression Scale for Children

Center for Epidemiological Studies Depression Scale for Children (CES-DC) is a depression scale developed by the National Institute of Mental Health in the United States to measure depressive symptoms in children. It consists of 20 items that assess the child's emotions and behaviors over the past week, with scores ranging from 0 to 3 and total score calculated by summing the individual item scores. In this study, we used the tool standardized for use on children in Korea [15], and a higher score indicates more severe depressive symptoms.

Screen for Children Anxiety Related Disorders

Anxiety among children was assessed using the Screen for Children Anxiety Related Disorders (SCARED) developed

by Birmaher et al. [16]. It is a self-report measure consisting of 39 items divided into five subscales: generalized anxiety, social anxiety, separation anxiety, panic disorder and somatic symptoms, and school phobia. A higher score indicates more severe anxiety. In this study, we used the scale adapted by Kim [17], and the questionnaire was completed by the children.

Evaluation of prenatal health risks

Prenatal health risks included the following 12 items: fetal positioning problems, premature rupture of membranes, severe vaginal bleeding, mild vaginal bleeding, rubella, pre-eclampsia, maternal seizures, significant emotional issues requiring treatment, serious family problems, accidents or injuries requiring treatment, physical issues (e.g., constipation, lower back pain, perineal infection, and heartburn), and severe psychological stress. These items were derived from obstetric assessment tools [18,19]. In this study, a score of 1 was given if each item was present ("yes"), and the summed score was used as an indicator of prenatal health risks.

Statistical analysis

Participants' sociodemographic characteristics were analyzed with descriptive statistics. The differences in the socioeconomic factors and emotional and behavioral scale scores between the ODD and control group were analyzed with independent sample t-tests and chi-square test. The distribution of comorbid psychiatric symptoms in the ODD group was compared with that in the control group using chi-square test. Multiple logistic regression was performed after adjusting for demographic factors, maternal depression, child's reported depression and anxiety scores, and comorbid psychiatric symptoms to identify the comorbid psychiatric symptoms significantly associated with ODD. Data were analyzed using the SPSS v.18 (SPSS Inc., Chicago, IL, USA), and significance level was set to $p < 0.05$.

RESULTS

Participants' general characteristics

The mean age of the 205 participants was 9.22 (± 1.48) years. There were 41.0% ($n=84$) male and 59.0% ($n=121$) female. The mean age of mothers was 39.18 (± 4.18) years. Thirty-three (16.1%) were in the ODD group. There were no significant differences in age, sex, socioeconomic status, and mother's educational level between the ODD and control groups, but the prenatal health risk score was significantly higher in the ODD group ($p=0.021$) (Table 1).

Comparison of emotional and behavioral problems between ODD and control groups

The ODD group had significantly higher scores for anxiety/depression ($p < 0.001$), somatic symptoms ($p=0.009$), social problems ($p=0.006$), thought problems ($p=0.002$), attentional problems (0.006), delinquent behaviors ($p < 0.001$), and aggressive behaviors ($p < 0.001$) compared to the control group.

Table 1. Differences between ODD group and control group on sociodemographic variables

Variables	ODD group (n=33)	Control group (n=172)	p
Age (yr)	9.45 \pm 1.62	9.18 \pm 1.45	0.329
Sex			0.568
Boy	15 (45.5)	69 (40.1)	
Girl	18 (54.5)	103 (59.9)	
Socioeconomic status			0.527
High	4 (12.1)	32 (18.6)	
Middle	20 (60.6)	105 (61.0)	
Low	9 (27.3)	35 (20.3)	
Maternal education level			0.447
Above college	30 (90.9)	141 (82.9)	
High school	2 (6.1)	24 (14.1)	
Below middle school	1 (3.0)	5 (2.9)	
Antepartum health risk score	1.30 \pm 1.43	0.85 \pm 0.92	0.021*

Values are presented as mean \pm standard deviation or number (%). * $p < 0.05$. ODD, oppositional defiant disorder

Table 2. Differences between ODD group and control group on psychometric scale

Scale	ODD group (n=33)	Control group (n=172)	p
K-CBCL			
Total problems	59.88 \pm 10.05	50.66 \pm 8.51	< 0.001**
Internalizing problems	58.97 \pm 12.00	51.46 \pm 8.53	0.001**
Externalizing problems	58.36 \pm 12.00	50.05 \pm 8.37	0.001**
Anxious/depressed	60.55 \pm 9.33	54.62 \pm 6.24	< 0.001**
Withdrawal/depressed	57.61 \pm 9.58	54.24 \pm 5.93	0.059
Somatic complaints	56.42 \pm 6.61	53.13 \pm 4.35	0.009**
Social problems	58.45 \pm 7.66	54.42 \pm 5.39	0.006**
Thought problems	58.85 \pm 6.93	54.51 \pm 5.78	0.002**
Attention problems	57.21 \pm 7.62	53.17 \pm 4.78	0.006**
Rule breaking behavior	58.91 \pm 7.15	53.83 \pm 4.98	< 0.001**
Aggressive behavior	60.30 \pm 6.79	53.42 \pm 4.94	< 0.001**
CES-DC	17.16 \pm 9.62	12.19 \pm 9.48	0.011*
SCARED	21.68 \pm 14.01	17.41 \pm 10.21	0.114
BDI-II	9.88 \pm 5.85	6.98 \pm 5.71	0.012*

Values are presented as mean \pm standard deviation. * $p < 0.05$; ** $p < 0.01$. ODD, oppositional defiant disorder; K-CBCL, Korean Child Behavior Checklist; CES-DC, Center for Epidemiological Studies Depression Scale for Children; SCARED, Screen for Children Anxiety Emotional Disorders; BDI-II, Beck Depression Inventory-II

The ODD group also had significantly higher child’s reported depressive symptoms ($p=0.011$) and maternal depressive symptoms ($p=0.012$), with no significant difference in child’s reported anxiety symptoms (Table 2).

Comorbid psychiatric symptoms and associated factors in ODD

In the ODD group, there was a significantly higher prevalence of GAD ($p<0.001$), social anxiety disorder ($p=0.034$), agoraphobia ($p=0.025$), separation anxiety disorder (0.009), ADHD ($p=0.029$), CD ($p<0.001$), and major depressive disorder ($p=0.007$) compared to the control group (Table 3).

In a regression analysis adjusting for sociodemographic factors, prenatal health risk score, maternal depression,

Table 3. Comparison of comorbid psychiatric symptom between ODD group and control group

Variables	ODD group (n=33)	Control group (n=172)	p
GAD	14 (42.4)	9 (5.2)	<0.001**
Social phobia	7 (21.2)	15 (8.7)	0.034*
Panic disorder	1 (3.0)	1 (0.6)	0.190
Agoraphobia	6 (18.2)	11 (6.4)	0.025*
Separation anxiety disorder	6 (18.2)	9 (5.2)	0.009**
PTSD	8 (24.2)	22 (12.8)	0.088
OCD	0 (0.0)	6 (3.5)	0.276
ADHD	11 (33.3)	29 (16.9)	0.029*
Conduct disorder	6 (18.2)	4 (2.3)	<0.001**
Major depressive disorder	3 (9.1)	2 (1.2)	0.007**
Eating disorder	1 (3.0)	4 (2.3)	0.810
Tic disorder	3 (9.1)	10 (5.8)	0.479
Elimination disorder	4 (12.1)	21 (12.2)	0.989

Values are presented as number (%). * $p<0.05$; ** $p<0.01$. ODD, oppositional defiant disorder; GAD, generalized anxiety disorder; PTSD, posttraumatic stress disorder; OCD, obsessive-compulsive disorder; ADHD, attention-deficit hyperactivity disorder

Table 4. Comorbid psychiatric symptom in relation to ODD group

Variables	Model 1		Model 2	
	OR (95%CI)	p	AOR (95% CI)	p
Social phobia	2.269 (0.720–7.149)	0.162	0.986 (0.213–4.560)	0.985
Agoraphobia	3.476 (0.951–12.699)	0.060	3.567 (0.654–19.446)	0.142
Generalized anxiety disorder	16.005 (5.394–47.494)	<0.001**	18.602 (5.386–64.247)	<0.001**
Separation anxiety disorder	2.895 (0.837–10.012)	0.093	1.464 (0.304–7.061)	0.635
Major depressive disorder	10.525 (1.429–77.505)	0.021*	4.345 (0.312–60.472)	0.274
ADHD	2.007 (0.790–5.098)	0.143	1.945 (0.570–6.635)	0.288
Conduct disorder	6.882 (1.483–31.939)	0.014*	9.529 (1.726–52.620)	0.010*

Model 1: adjusted age, sex, socioeconomic status, maternal age, maternal education level, antepartum health risk score, BDI-II total score, CES-DC score, and SCARED score. Model 2: adjusted age, sex, socioeconomic status, maternal age, maternal education level, antepartum health risk score, BDI-II total score, CES-DC score, SCARED score, and comorbid psychiatric disorder. * $p<0.05$; ** $p<0.01$. ODD, oppositional defiant disorder; OR, odds ratio; CI, confidential interval; AOR, adjusted odds ratio; ADHD, attention-deficit/hyperactivity disorder; BDI-II, Beck Depression Inventory-II; CES-DC, Center for Epidemiological Studies Depression Scale for Children; SCARED, Screen for Children Anxiety Related Disorders

child’s anxiety and depression scores, and comorbid psychiatric symptoms, GAD (adjusted odds ratio [AOR]=18.602, 95% CI=5.386–64.247, $p<0.001$) and CD (AOR=9.529, 95% CI=1.726–52.620, $p=0.010$) were significantly associated with ODD (Table 4).

DISCUSSION

This study analyzed the psychiatric symptoms comorbid with ODD in elementary school children, and ODD was significantly comorbid with internalizing and externalizing problems. In addition to CD and ADHD, ODD was significantly comorbid with symptoms of anxiety disorder and depressive disorder, and particularly, GAD and CD were significantly associated with ODD symptoms.

The prevalence of ODD varies widely depending on the diagnostic tool and patient’s age and characteristics, and in our study, the prevalence of ODD was 16.1%. In a previous study on elementary school children, ODD prevalence estimated based on parent-reported questionnaire was 13.28% [20]. In another study conducted on children aged 9 and 10 years, similar to our study population, the ODD prevalence reported by parents was 14.0% [21], which was also similar to our study.

A previous study reported that stress and smoking throughout pregnancy are associated with the risk for ODD [22], and in our study, the ODD group had a higher prenatal health risk score. Considering that prenatal-perinatal risk factors serve as important biological factors contributing to the development of psychiatric disorders in childhood, additional research examining more diverse prenatal-perinatal health risk factors is needed. Maternal depression was significantly higher in the ODD group, in line with previous findings that maternal depression increases the risk for child’s oppositional defiant behaviors [23].

In this study, the ODD group had significantly higher scores

in all questionnaires with the exception of the withdrawal subscales on K-CBCL, consistent with previously reported emotional and behavioral problems comorbid with ODD in children in Korea [6,24].

Approximately 36%–46% of individuals with ODD also exhibit other psychiatric disorders defined by DSM-IV, with CD, ADHD, depressive disorder, and anxiety disorder being some of the common comorbidities [25]. These were similar to our results. Around 30% of individuals with ODD are reported to have ADHD [2,25], and our results also showed that ADHD was significantly more prevalent in the ODD group (33.3%) than the control group.

In our study, 18.2% of children with ODD showed symptoms of CD, and CD was identified as a significant factor associated with ODD. CD and ODD share environmental factors, such as genetic factors and dysfunctional family-related factors, such as parents' drinking and maternal depression, and these two disorders have a high comorbid prevalence [3]. Although some studies reported that ODD develops as a precursor to CD and eventually progresses to CD [26], a study that followed-up children and adolescents for emotional and behavioral problems for seven years showed that conduct problem predicts psychopathologies such as ODD, ADHD, depression, and anxiety, in later years of life [27]. Thus, our results indicating that CD is a significant risk factor of ODD may suggest a reciprocal temporal association between ODD and CD. However, our study cannot establish the temporal causality between the two disorders, so further research is needed to examine the long-term progression and changes of psychopathologies.

In this study, anxiety disorders, such as GAD, social anxiety disorder, separation anxiety disorder, and agoraphobia, were significantly higher in children with ODD symptoms, and 9.1% of the children also had major depressive disorder. Previously reported prevalence of major depressive disorder among community-based children with ODD ranged from 15%–46% with an average odds ratio of 17.5. The prevalence of anxiety disorder ranged from 7%–14%, with an odds ratio of 5.4 [25,28].

In our study, anxiety disorder was more prevalent than depressive disorder, and GAD was a significant predictor of ODD. In a clinical study, 60% of adolescents with ODD met the diagnostic criteria for anxiety disorder [29], and some studies reported that ODD symptoms are significantly associated with GAD symptoms [30]. ODD is a multidimensional disorder that includes emotional problems such as irritability and angry mood, as well as defiant and aggressive behavioral problems. Irritability is considered a diagnostic criterion for GAD and is closely related to anxiety in children and adolescents. The high comorbidity rate between anxiety

disorders and ODD can be attributed to several common risk factors, including heightened emotionality that renders the child vulnerable to negative emotions (e.g., anger, frustration, and fear), temperament issues such as low effortful control, social information processing bias, and dysfunctional limbic systems and prefrontal cortex [31]. Further research is essential to gain a comprehensive understanding of the shared pathogenesis and course of ODD and GAD, as well as treatment.

This study has a few limitations. First, as a community-based cross-sectional study in single region, it is challenging to establish causal relationships or predict the progression and changes of comorbid psychiatric symptoms. Second, although we evaluated the core symptoms of ODD per DSM-IV, we relied on parent surveys rather than structured diagnostic tools and did not include an evaluation of functional impairment. However, identifying children with significant ODD symptoms and risk factors in the community setting holds significance for future preventive interventions at the community level. Third, we could not fully capture the diverse biological and environmental factors contribute to the onset of ODD. Although we considered factors such as maternal depression and prenatal health risks, it was difficult to compare differences in individual items such as prenatal smoking and stress, and we could not sufficiently consider well-established environmental factors such as dysfunctional family problems and parent-child relationships that are known to be major contributors to the onset of ODD when analyzing odds ratio of comorbid psychiatric symptoms. Additional studies are needed to explore factors that may influence the onset and course of ODD in consideration of range of factors.

CONCLUSION

This study aimed to investigate the prevalence and impact of comorbid psychiatric symptoms in children with ODD. ODD is characterized by both externalizing and internalizing problems, along with a variety of psychiatric symptoms. Particularly, as CD and GAD are significant psychiatric symptoms comorbid with ODD, it is important to evaluate these comorbid symptoms in the evaluation and treatment of ODD. Future studies should conduct systematic and long-term follow-up studies on the risk factors, progression, and early interventions for ODD in community-based school-age children.

Availability of Data and Material

The datasets generated or analyzed during the study are available from the corresponding author on reasonable request.

Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

Author Contributions

Conceptualization: Na Ri Kang. Formal analysis: Yong Hun Kim, Na Ri Kang. Investigation: Duk-Soo Moon, Na Ri Kang. Writing—original draft: Yong Hun Kim, Na Ri Kang. Writing—review & editing: Yong Hun Kim, Duk-Soo Moon.

ORCID iDs

Yong Hun Kim <https://orcid.org/0009-0003-1533-3270>
 Duk-Soo Moon <https://orcid.org/0000-0001-7878-3410>
 Na Ri Kang <https://orcid.org/0000-0002-2086-0927>

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